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ABSTRACT

This book presents an introduction to the range of technology that can be used to assist in the education of students with visual impairments, with descriptions of the main features of approximately 45 systems. After an introductory chapter, Chapter 1 identifies four key uses for technology: in communication, in the production of materials, to provide access to information, and as a curriculum tool. Chapter 2 explains different computers and accessories including expansion cards, ink printers, scanners, CD-ROMs, special access systems, and overlay boards. Chapter 3 describes large display systems, including large text on screen, large print word processors, computer magnification systems, magnification system hardware, closed circuit television systems, and large print (paper). Chapter 4 reviews a variety of Braille systems such as electronic Braille displays, Braille note takers, mechanical Braille keyboards, and translation software for Braille. Chapter 5 evaluates speech systems, including screen readers, speech synthesizers, talking word processors, and different speech devices. A final section includes articles and information intended for specialists. Articles address materials production, selection of a laptop, the Internet, and sources of information and support in the United Kingdom. Includes a list of resources in the United Kingdom and a glossary. (CR)

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access technology

a guide to educational technology
resources for visually impaired users



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access technology

a guide to educational technology
resources for visually impaired users

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While every effort has been made to check the accuracy of the information in this book, RNIB cannot be held responsible whatsoever for any errors contained in *Access technology*. Readers are therefore advised to check all details with suppliers before purchasing an item.

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Introduction

This book provides an introduction to the large range of technology designed to assist visually impaired pupils and students. Written for parents, professionals and visually impaired students, it provides technology information at an introductory level to enable readers to identify the main features of each system described. There has been no attempt to evaluate systems by comparison with each other, since the main focus of this book is to present technology in relation to student needs.

The range and complexity of equipment makes it difficult to devise simple technology categories. We have opted to group systems by the medium in which the pupil works: large print, braille and speech. Our choice is by no means perfect since some computer systems use two or even three channels of communication. Indeed, many pupils use more than one communication medium depending on circumstances. For example, a pupil using a portable speech device to write and edit a document may want a copy in large print to hand in to the teacher and a second copy in braille for personal reference. In fact it is not unusual for some visually impaired students to use a combination of all three media. However, the categories we have chosen are clear and easy for readers to refer to.

Accuracy of information

Information about prices and suppliers is based on current catalogues and responses from suppliers. Prices and circumstances change rapidly in the world of specialist technology, so please check first with the suppliers themselves to ascertain prices and details of products. RNIB cannot be held responsible whatsoever for any inaccuracies contained in *Access technology*.

Prices

Please note that nearly all prices are quoted exclusive of VAT. Persons who are registered blind may be exempt from paying VAT on certain items. Usually VAT exemption applies only when the item being purchased is a specialised device for use by a visually impaired person, for example a braille computer. Non-specialised equipment such as an ordinary computer does not attract exemption.

Suppliers

In some instances the same device is available from more than one supplier. We suggest you contact several suppliers to assure yourself that you are getting the deal that suits your needs.

Glossary

We have tried to keep technical terms to a minimum. To assist with unfamiliar



terms, a glossary has been provided at the back of the book.

Acknowledgements

This book draws upon the expertise and support of many people. I would like to thank my co-editor Jason Arthurs, who took responsibility for updating the directory section of the book. Special mentions go to Eamonn Fetton for his overview of the role of technology in the education of visually impaired children; to Max Hampson for his chapter on braille systems; and Jo Fullerton for her section on Apple computers. I would also like to thank Mary McDonald who undertook the copy editing. Her

observations and suggestions have improved the publication no end. Sandra Barrett did the design and I'd like to thank her for her persistence and patience perseverance in achieving such a high quality publication.

We have extended this issue of the directory to include articles about technology and visually impaired users. My thanks go to the contributors Peter Bosher, Les Mason and Roger Wilson-Hinds. Finally a big thank you to all the suppliers who generously gave their time to provide product information and to comment on the text of the directory.

John Lodge
Training Technology Officer
March 1996



Chapter one

The role of technology

Eamonn Fetton



There are four key uses for technology in the education of visually impaired students. First there is communication – using technology to provide an alternative means of reading and writing (or processing information). Next, technology can help in the production of learning materials, for example to produce braille and large print resources required by visually impaired pupils. A third use for technology is to provide improved access to information for students. One such example is a Teletext adapter which enables information from BBC Teletext screens to be spoken out. Finally, technology can be used as a curriculum tool to help pupils develop concepts and skills in English, Maths and other subjects. This book describes the hardware relevant to all four areas mentioned above, but it will be especially useful to those concerned with technology assisted communication.

For a blind student, technology has many specific benefits. It offers direct and independent access to print through the use of 'optical character recognition' systems. It gives auditory and tactile access to information stored on CD-ROM and other databases as well as efficient methods of recording and manipulating data. Blind students can obtain auditory and tactile output from a word processing system thereby supporting their writing. Technology also greatly assists the translation of printed documents into braille.

For a partially sighted user, the key feature offered by technology is the ability to display print and illustrations in a range of sizes both on paper and on the screen.

Technology can also make a significant contribution in the education of visually impaired children who have additional learning difficulties. However it is beyond the scope of this guide to cover this area in detail. Interested readers are referred to the brief section on 'switch systems' in the next chapter.

Although the scope for offering visually impaired pupils independent and efficient study strategies is wide, it is worth noting that technology cannot overcome all difficulties. Equally, the benefits of technology to the individual



are only realised when careful consideration is given to assessment, training, technical support and the creation of a supportive learning environment.

Choosing the right technology

It is sometimes quite difficult to be certain whether a technology device or system will meet the particular needs of an individual pupil. A checklist is offered below to assist in the identification of some of the more important issues. A full discussion of these issues is beyond the scope of this guide, but the checklist underscores the need for careful consultation, assessment and planning in order to achieve the successful introduction of technology.

Checklist

- ☐ what are the pupil's current curriculum access requirements?
- ☐ what factors are likely to affect the pupil's ability to master new communication skills and operate computer devices?
- ☐ in what particular ways could technology be used?
- ☐ could technology be used to produce learning materials?
- ☐ which input, storage and output features are most likely to match the pupil's needs and skills?
- ☐ which computer systems offer the right combination of input, storage and output features?
- ☐ what 'entry level' skills are required to take on the selected computer system?
- ☐ what are the initial and ongoing

training requirements for both the pupil and support staff, if the technology is to be successfully introduced?

- ☐ what are the implications of the technology for the organisation of work and for study strategies?
- ☐ in what ways should class and subject teachers be encouraged to modify their teaching methods to take account of the communication system in use?
- ☐ in what respects will the introduction of new technology affect the nature and level of in-class support required by the pupil?
- ☐ what level of technical support will be required to introduce and maintain the technology?

Training

Training is vital to the successful introduction of technology. It is necessary to consider what the training aims to achieve for the user. What areas of competence should be covered? What criteria should be used to judge the effectiveness of the training? How should it be delivered and who will deliver it? What will it cost?

Training should be needs-based rather than system-based; it should focus on meeting the particular needs of the individual rather than introducing the user to the whole range of technical features of the device. If curriculum access needs have been properly assessed then the technology will have a specific role to play; the training programme should address these issues.

For example, a pupil may need an efficient means of taking notes in class or of completing homework tasks. The



training programme may need to include computer awareness, word processing, file management, operation of controls and connections, and the introduction of new study strategies. The success of the training programme will depend on the extent to which the user accommodates the technology within personal learning strategies.

Pupils often need continuing support in order to use technology effectively. RNIB National Education Service staff like to involve a member of the pupil's support team in the training programme. This helps to ensure that the programme is addressing the pupil's practical needs as well as building in a

means of ongoing support by training a member of staff. Technology often fails to deliver results due to lack of training. It is essential to budget for training at the same time as allocating finance for the purchase of equipment.

Most trainers currently charge around £250-£300 per day for their services. Many suppliers offer a training service but in some instances this may be biased towards technical information rather than educational needs. RNIB National Education Services offers a wide range of training opportunities including tailor-made courses for schools, colleges and individuals. For more details please see Information and support (p99-104).

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Chapter two

Computers and accessories

Jason Arthurs



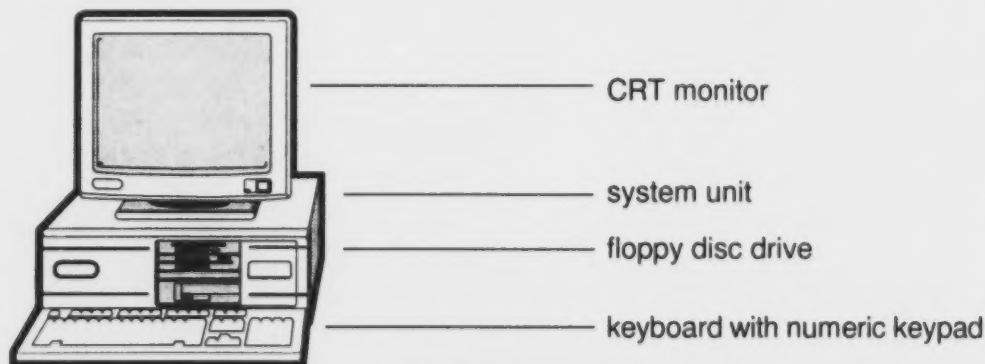
This chapter reviews the different computers and accessories currently used in education and considers the benefits each has to offer. The purpose here is to provide an introduction to computers for beginners.

The desktop computer

The main external features of the desktop computer are labelled below:

The desktop computer is the largest of the standard computers and, as its name suggests, it is designed to sit on top of a desk. It usually remains in one place and makes no concessions to portability. Such a machine would suit a student who works mostly from a single base, for example a primary school pupil working from a single classroom or a student who undertakes a significant amount of work at home.

Desktop systems vary enormously in specification but they often have good quality colour monitors, which is of great benefit to many partially sighted students. The desktop computer can accommodate lots of accessories such as scanners, CD-ROM drives, modems, speech synthesisers and so on. Each accessory comes with an expansion card (circuit board) which needs to be inserted into the computer. Desktops usually supply several spare expansion



Desktop computer



Features of a desktop computer	
Feature	Description
System unit	This box contains the (microprocessor), hard disc drives, floppy disc drives and supporting circuitry. There are spaces for external and internal sockets to allow external devices to be attached to the computer eg printer, scanner, CD-ROM etc
CRT monitor	A CRT (cathode ray tube) monitor or screen displays high quality colour text and graphics.
Keyboard	Qwerty keyboard with separate numeric keypad

slots within their system unit for just this purpose. Consequently, the desktop is well suited to coping with the specialised accessories which visually impaired people need for their work.

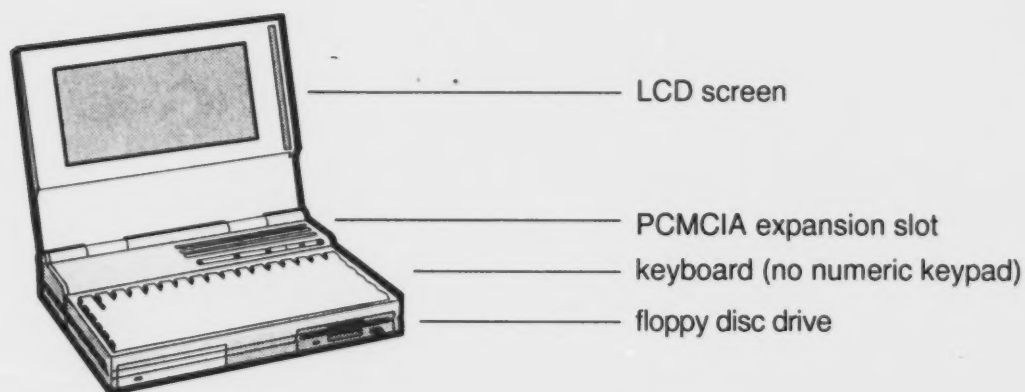
The laptop computer

A laptop is a portable computer which can run on batteries as well as mains power. Older laptops were rather 'luggable' machines but present-day models are designed to be easy to carry about. Note that reduced size does not imply reduced processing power – laptops are every bit the equal of many

of their desktop counterparts when it comes to running business applications.

Classes of laptop

As its name suggests, the laptop machine is a portable computer designed to be used 'on the lap'. Various sizes of laptops are manufactured and different names are given to each class of them. The *notebook*, for example, describes a portable computer with a footprint about the size of an A4 sheet of paper. Next size down from the notebook is the *sub-notebook*; this has a base little more than the size of a sheet of A5 paper. Sub-notebooks adopt



laptop computer



Features of a laptop computer	
Feature	Description
LCD or TFT screen	The liquid crystal display screen is available in both colour and monochrome although many suppliers now only market colour models. Thin film transistor (TFT) screens are exclusively colour and represent better quality than the LCD colour screen but are substantially more expensive.
Expansion slots	Laptops are unable to take normal expansion cards due to their size. Most modern laptops have the ability to use credit card sized (PCMCIA) cards instead of their fully sized counterparts
Keyboard	Full qwerty keyboard with an 'embedded' numeric keypad accessed using a function key.
Floppy disc drive	Most have built-in 3.5" drive although some of the smaller models have external floppy drives.

radical weight and space-saving strategies, for example they often dispense with the internal floppy disc drive, store programs in ROM (internal chips) and provide miniature pointing devices to replace the mouse. The smallest of the laptops is the *palmtop*. The palmtop is at the cutting edge of portable technology and can deliver powerful processing – quite literally in the palm of the hand.

Batteries

The great advantage of the laptop computer is that it can deliver mobile computing. A well designed laptop should offer the user an extended period away from mains electricity. Crucial to mobility is the battery life of the computer. Recent advances in battery technology have allowed manufacturers to make batteries lighter and smaller. Early laptop batteries were lead-acid; but these were replaced by lighter *Nickel Cadmium* (NiCd) rechargeable ones which in their turn have been superseded by *Nickel-Metal Hydride* (NiMH) and now the more

efficient *Lithium-Ion* models. However despite advances, the average battery life for a laptop computer remains at around two to three hours. Although many manufacturers quote much higher times – some as much as five hours – it is wise to treat these figures with caution since the computer may not be operating in 'typical' conditions. A visually impaired learner using a laptop will have to plan ahead and ensure that a mains socket is nearby; especially at critical moments during the day when the computer battery is running down. It is also worth considering that some laptops are capable of using two batteries to increase the time between charges.

Laptop versus desktop

A frequent decision that has to be made is whether to choose a desktop or a portable computer. Many pupils move around from class to class during the school day so mobile technology appears a realistic option. However it is important to realise that although they have great advantages in terms of mobility, laptops are inferior to



Comparing the LCD and CRT screens of budget-priced computers

	Notebook screen	Desktop CRT screen
Type	Monochrome or colour LCD	Colour
Size	9.5" (24.1cm)	14" (35.5cm)
Contrast	15:1	100:1
Refresh rate	30 times/second	>72 times/second

desktops in three important ways: the keyboard, the display and the scope for expansion. A serious deficiency in any one of these aspects may rule out the purchase of portable technology for an individual child.

Two aspects of laptop keyboards deserve consideration: firstly the size of the laptop keyboard itself and secondly the lack of a separate numeric keypad. Although the laptop usually has a smaller keyboard than the desktop, both notebook and sub-notebook still allow touch-typing; only the palmtop does not. This rules out the palmtop for general purpose word processing.

Unlike the desktop, the laptop has a keyboard that lacks a separate numeric keypad. Keypad functions are available, but only by means of duplicating the functions of other keys. This procedure can be very cumbersome. The numeric pad can be important in some instances since it is used by certain programs (for example Lunar for DOS) to allow a partially sighted user to navigate an enlarged text screen. One solution to this problem is to use a 'sticky keys' utility program. This allows the user to execute multiple key operations (such as Shift-key) with a single finger. Windows 95 offers this feature. It is possible also to purchase an external keypad to connect to the laptop; but this

is an additional expense and increases the size and weight of the system.

Note that there has been a new development in the design of some laptop keyboards; in particular, the 'butterfly' keyboard made by IBM. This keyboard is made of two parts which lock together when in use, and fold away when the laptop is closed.

The quality of a laptop screen is also crucial in deciding whether to adopt portable technology in preference to a desktop computer. The LCD screen of the laptop can be inferior to the desktop CRT screen in three ways: size, contrast and refresh rate (see table above).

Typical notebook screens are around 9.5" - 10.4" (24.1 - 26.4cm) and consequently much smaller than the standard 14" (35.5cm) cathode ray tube (CRT) screen of the desktop. Although laptop screens are increasing in size and quality, the limiting dimension becomes the size of the laptop itself. The maximum size screen currently available on the market is 11.4" (28.9cm) although this is a top of the range machine. This is a large reduction in display area compared to the 14" (35.5cm) desktop display and may prove to be too limiting for some users. This can be the case, for example, for some partially sighted people using a



magnification program. The laptop LCD screen also presents a much lower contrast image than does the desktop CRT monitor. A typical LCD screen has a contrast of 15:1 which means that black approximates to a very dark grey and white is not as bright as on a CRT monitor. By comparison, the contrast rating for a CRT screen is 100:1 making it over six times superior to the laptop's LCD screen. Whilst some visually impaired learners can work happily with the reduced contrast, others find it almost impossible to read text on an LCD screen.

Another feature to bear in mind with a laptop screen is that to conserve power, the LCD screen has a low refresh rate. A conventional TV set re-draws or refreshes the screen 50 times every second; a CRT computer monitor does this around 72 times a second. However, a typical laptop screen is refreshed between 15 and 30 times a second. A consequence of this is that any movement on the screen – such as moving a mouse pointer – will 'smear' or, in the case of fast movements, will cause the mouse pointer to actually disappear and only reappear at its destination point. This loss of control can make it especially difficult for partially sighted learners to work with MS Windows and other programs which the user controls by pointing at graphics (graphical user interfaces). It should be noted, however, that the quality of newer screens is making this less of a problem than it was even 18 months ago.

Laptop screens are continuing to improve in quality. Recent developments such as 'double scan' screens (which refresh the display twice as quickly) and TFT (thin film transfer) screens, give performance almost

comparable to a CRT monitor. However these screens cost much more than the standard LCD one.

Laptops have no physical space to plug in standard expansion cards for add-ons. This has meant that, until recently, there were certain devices which could not easily be connected to a laptop. However, many new laptops (especially PC compatibles) have adopted a new international standard to assist expansion. They use the PCMCIA 'credit card-sized' expansion card.

Hardware platforms

The way a computer operates depends on its internal construction, for example the choice of microprocessor. The internal design of a computer is called its architecture – computers with architectures which have much in common are called platforms. There are currently three different computer platforms used in British schools: IBM PC (or compatible), Acorn Archimedes and Apple Macintosh. Each of these platforms operates in a different way, so when selecting a program to use, it is important to buy one for the computer platform you have in mind. Programs are designed for use with a specific type of computer and will not work with any other kind.

IBM PC compatible computers

The world's best selling computer is the IBM Personal Computer compatible (or PC). The present popularity of this standard can be attributed to its launch at a time when IBM dominated world computer markets. Origins apart, the PC has developed into a very versatile machine. Although it was first made for a rather narrow range of business



applications, third party developers have created a large raft of software and hardware accessories which now allow the PC to undertake many different functions.

The processing power of an individual PC – and hence the kind of programs that it can run – is related closely to the kind of microprocessor installed in the computer. The majority of machines being produced at the time of going to press are using Pentium 90 or Pentium 120 processors, with machines like the 486DX 66 being gradually phased out. In addition to this some machines are now being produced with the Pentium Pro chip which is the next step beyond the original Pentium processor and will probably represent next year's standard desktop processor.

A PC compatible can be expanded using add-on or expansion cards which allow it to do new tasks. It can, for example, read text from a printed page via a scanner or again use the Internet link into other computers across the world to obtain information about a specialised subject. The wide range of additional equipment that can be attached to even the cheapest PC, makes it one of the most versatile machines available. Peripherals for the PC are generally at competitive prices – an attractive reason for buying this computer.

However, there is a down side to this situation. The proliferation of PC peripheral manufacturers has meant, in many cases, that devices apply their own standards of operation. In practice, this can mean that some PC accessories are especially difficult to connect up and get working with the computer. Expert help is often required for even seemingly straightforward tasks, for example

installing a CD-ROM. It is to be hoped that the new 'plug and play' technology supported by the Windows 95 operating system will go some way to simplifying the attachment of peripherals to PCs.

A large range of software exists for the PC and prices vary from the cheap to the highly expensive; this includes the best range of access software for visually impaired users. Much early PC software was based directly on DOS (Disc Operating System). These programs had highly individualistic user interfaces making it impossible to have a standard means of communicating with the computer.

DOS has now been largely superseded in the business world by Windows - a graphical user interface which has brought much standardisation to the way software looks and operates. Unfortunately, whilst Windows works fine for those with sight, it can be a real barrier to people with a visual impairment. Speech synthesisers, for example, find it difficult to function with Windows (although there have been important advances here). By and large, however, many visually impaired users will prefer to work with DOS software since it provides satisfactory access.

Purchasing a PC

It is unwise for a novice to purchase a computer without expert advice from a trustworthy source. However, in order to help the reader understand the factors to bear in mind when choosing a (desktop) computer, a specification is suggested on page 17. Note that this advice is general and that the needs of an individual user will dictate precisely what is required. Be aware also that computer technology develops at a



phenomenal rate; what is good advice today may be out of date in three months! So check first with a good source before you buy.

When you purchase be sure that the computer:

- ☐ works all the programs to meet the needs of the user
- ☐ can be expanded to meet the medium term future needs of the user
- ☐ works all specialist accessories
- ☐ is comfortable for the user to operate.

The choice of microprocessor is crucial; at the time of writing a 90 megahertz (MHz) Pentium microprocessor should provide a useful life for a system. Computers need plenty of working memory, known as RAM, in which to run programs; a minimum of 8 megabytes of RAM is recommended unless you intend to use Windows 95, in which case 16 megabytes is advisable.

Computers save information on disc. A large internal disc drive, called the hard disc, is used to store programs and data and a floppy disc drive allows information to be stored on diskettes. Current software and operating systems need lots of disc space. A 540 megabyte (approx) hard disc drive is advisable with a 3.5 inch floppy disc drive.

Computers display information on a monitor and the 14" (35.5cm) super VGA (SVGA) colour version is now standard. A monochrome screen can be selected instead of a colour model, if the user prefers it. Monochrome screens provide better definition pound for pound. Monitors are controlled by means of a graphics card installed in the computer; go for a card with at least

1 megabyte (Mbyte) on board. Most suppliers will include a mouse in the price of the system, as well as the DOS and Windows operating systems. Many suppliers are offering Windows 95 packages with systems; this may or may not be advisable depending on what additional technology you wish to use. Many suppliers still offer Windows 3.x with DOS as an option.

Warning

Windows 95 is still a very new operating system and many of the specialist products listed may not be able to run under Windows 95. Developers are currently working on Windows 95 versions of many of these packages. However if you intend to use Windows 95 please check with the supplier that the software is compatible with Windows 95 **before** purchasing.

Computers allow a range of external accessories to be attached to them. Make sure the computer you purchase has plenty of expansion slots to accept these accessories; a minimum of five are needed.

Visually impaired pupils are making increased use of CD-ROMs. If you want your computer to access these discs then you will need a CD-ROM drive, a sound card and a pair of speakers. A 'quad speed' drive and a Soundblaster AWE32 sound card setup are recommended. Quad speed is rapidly becoming the entry level for CD-ROM drives. There are lots of good sound cards on the market, but the AWE32 has a limited implementation of DECtalk speech built into it. DECtalk is high quality speech and can be of real value to some users. However the AWE32 only offers partial access to Windows through speech. For



RM Nimbus computers

System	Processor	Hard disc	RAM	Price
Works Plus System	50 Mhz 486 DX2	340Mb	4	£669
PC 575 Accelerator	75 Mhz Pentium	420Mb	8	£1,099
Multimedia Window Box	100 Mhz 486 DX4	420Mb	8	£1,699

full access, you need to purchase a Windows screen reader (see Chapter 5).
Recommended specification for a desktop PC system for general use:

Pentium 90Mhz microprocessor
 8 Mb RAM (16 Mb if you intend to use Windows 95)
 540 Mb hard disc drive
 3.5" Floppy disc drive
 SVGA colour monitor
 1 Mbyte graphics card
 Mouse
 DOS & Windows or Windows 95
 5 internal expansion slots

Optional extras:

Quad speed CD-ROM drive
 Soundblaster AWE32 sound card

so much of what is written in the previous section applies here. However, RM has its roots in supplying computers for the educational market and its products reflect this. RM currently produce PCs with 486 and Pentium processors, but plenty of the older Nimbus PC-186 machines are still in use in schools.

RM have been developing a range of educational courseware products based on Microsoft software. In addition, they market a customised system for primary schools which they call the Window Box. If you are purchasing an RM Nimbus the advice for the PC (above) still holds good.

Acorn computers

Acorn Computers have been producing machines aimed at the education market for almost 15 years. One Acorn product,

Research Machines computers

RM computers are IBM compatible PCs,

Acorn computer systems

System	Hard disc	RAM	Price
A3020	60Mb	2Mb	£825
A4000	80Mb	2Mb	£850
A4000S	80Mb	2Mb	£850
A5000 Multiscan	80Mb	2Mb	£1,275
A5000 Learning Curve	80Mb	2Mb	£1,318
RISC PC600	210Mb	2Mb	£1,249
A4 Notebook	60Mb	4Mb	£1,699



Apple Macintosh computers			
System	Hard disc	RAM	Price
Performa 630	500Mb	8Mb	£1,079
Performa 630	500Mb	12Mb	£1,379
Performa 6200	500Mb	8Mb	£1,249
Performa 6200 Plus	800Mb	8Mb	£1,345
PowerMac 7200/75	500Mb	8Mb	£1,349
PowerMac 7200/90	500Mb	8Mb	£1,649

the BBC Micro (and its successor the BBC Master) still accounts for a large number of computers in schools, although neither of these models are now in production. The BBC/Master range probably has the most comprehensive range of educational software and hardware, especially in the field of special educational needs. However, these machines are ageing fast and cannot be expected to last for much longer.

Acorn's subsequent product is popularly called the Archimedes; it has a much superior operating system to the older BBC range. Most Acorn computers are not PC compatible and this relegates them to something of a 'minority market' in the eyes of the business community. However Acorn's latest range of RISC-PC machines have the capability to plug in a 486 processor making it a PC and Archimedes compatible machine. A number of educational software developers have remained loyal to Acorn from their BBC/Master days and there now exists a wide range of programs for schools to

use. This is especially true of special educational needs software and there are several programs of potential benefit to visually impaired learners.

Apple computers

Apple are establishing an educational market for themselves with a policy of preferential prices for educational users. Apple is making great in-roads into parts of the UK, for example some Scottish regions. Apple also make laptop computers which are a popular choice for visually impaired students who move between classrooms. When purchasing desktop Apple Mac computers most schools are now choosing models with internal CD-ROM drives.

All Apple Mac computers have built-in sound cards and speakers. External speakers which give higher volume and sound quality are usually extra, costing from £40 upwards. The monitor, keyboard and mouse are often sold as extras so always check whether these are included in prices quoted.



Apple Mac computers are frequently sold with a range of software included such as Claris Works for word processing and the Grolier Multimedia Encyclopedia on CD-ROM disc. They are usually referred to as 'Plus' or 'bundle' models and can be good value.

Recommended specification for a desktop Apple Macintosh computer for general use:

601 75Mhz or 603 75Mhz RISC microprocessor
 8Mb RAM (minimum)
 500 Mb hard disk drive (minimum)
 3.5" floppy disc drive
 15" multiple scan colour monitor
 Quad speed (x4) CD-ROM drive
 Apple keyboard
 Mouse
 System 7.5.1 or 7.5.2
 1 internal expansion slot (minimum)

PC/Mac conversion programs

There are a number of software programmes such as PC Exchange (£40), Access PC (£45) and DOS Mounter Plus (£55) which enable an Apple Mac to read PC files. Files written on an Apple Macintosh should be saved as DOS text if they are to be read on a PC. File formats will not transfer, but text will. It is possible to transfer files between Mac and PC in either direction retaining original formats, by using MacLink Pro PC Connect (£139).

DOS and Window programs

The Performa 630 is available as a DOS compatible computer with a DOS card fitted to enable the running of DOS and Windows software. The card can be added later but must be installed by an Apple authorised engineer. DOS cards

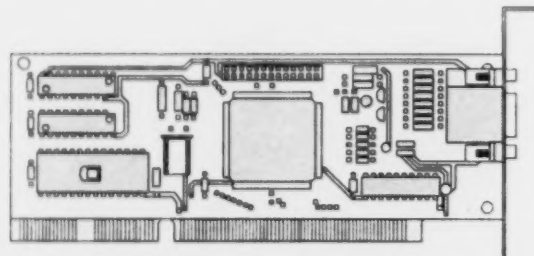
currently cost around £400 if purchased separately. It is recommended that the computer has 16Mb of RAM which can be purchased as an upgrade. The Power Macintosh 7200 has the equivalent of a 486DX2 75 Mhz (or 90 Mhz) microprocessor and can run DOS and Windows programs using software emulators such as SoftPC and SoftWindows. In theory a Mac program and a PC program can be run simultaneously, however DOS and Windows programs will probably run slower than on a PC and if too many applications are running at once the computer may 'hang'. Again, a minimum of 16 Mb of RAM is recommended.

Computer accessories

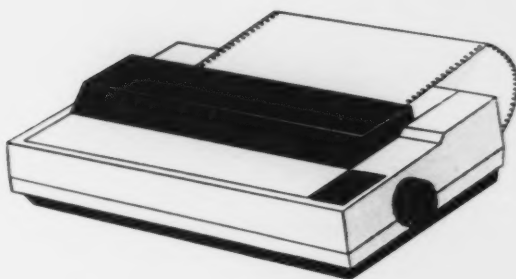
Adding accessories to your computer greatly increases the number of tasks it can do for you. Here are some of the more common accessories bought for use with a computer.

Expansion cards

It is worth mentioning that most computer accessories come in two parts: the external equipment itself and an accompanying circuit board (called a card) which is plugged inside the computer. The card is inserted into an



An expansion card



Dot matrix printer

'expansion slot' inside the computer. Visually impaired users often use specialist computer accessories, for example an internal speech card, an optical character recognition (OCR) system, an additional parallel/serial card (to cope with both printer and embosser), a Teletext card, a graphics card, an internal modem, a CD-ROM, a sound card and so on. It is essential therefore that there are enough internal expansion slots within the computer to take these cards.

Ink printers

Ink printers allow you to print out your documents on to paper. There are three main kinds of ink printers: dot matrix, inkjet and laser.

Dot matrix printers

The dot matrix printer has proved a popular choice with schools. It is cheap to run and reliable in operation. This printer uses a row of pins which move across the paper striking a ribbon to form letters using a matrix of dots. Dot matrix printers fall into two groups: 9 pin and 24 pin. The more pins that are used to make up the letters, the better the quality of the print. Nine pin printers are well suited for drafting documents or when good presentation is

not essential. However, some visually impaired people may find draft quality print difficult to read, since there is insufficient contrast on the paper.

In addition to mediocre print quality, a limitation of dot matrix printers is that they support a restricted number of fonts. Neither are they well suited to graphical work. Since the printer cannot guarantee a consistent density of ink when printing, graphics suffer from 'banding' where the printer fails to print every line with the same quality of ink. These weaknesses mean that dot matrix printers are rarely a first choice for partially sighted users.

In any case dot matrix printers are currently losing ground to the cheaper inkjet printers. Nonetheless they remain a very popular printer in general use and are still very widely available. Prices vary from £92 excluding VAT for an Epson LX300 9 pin, to around £429 excluding VAT for an Epson LQ1170 24 pin model.

Ink-jet and bubblejet printers

Inkjet and bubblejet printers squirt ink at the paper. This is an efficient way of printing and produces good results, second in quality only to laser printers. The print head and ink cartridge of the inkjet are built into a single unit so when you replace the ink, you also replace the parts that in a normal printer would be prone to wear and tear. These printers cost less than laser printers and the quality itself is very close, even for printing graphics – although they do suffer from banding (lines across the picture) – but to a lesser extent than do dot matrix printers. Inkjets also suffer when not used for long periods such as during the summer holidays. The ink dries in the jets and



the cartridge has to be thrown away although newer ink formulations make this less likely. A real benefit of inkjet technology is the small size of the printer; this has led to inkjets becoming the leader in portable printing technology. Portability can be an important factor for students on the move and inkjet printers have taken over a very large proportion of the dot matrix market and are even making an impression on the sales of laser printers. *Prices vary from £139 excluding VAT for a Canon BJ30 portable inkjet, to around £200 excluding VAT for a Hewlett Packard HP DeskJet 600 desktop model.*

Laser printers

Laser printers produce the highest available print quality and current prices make them increasingly affordable machines to put on your desk. Laser printers work in much the same way as a photocopier and use toner in place of ink or ribbons. The quality of the print on these machines is measured in dots per inch (dpi) and a standard laser printer should be capable of 600 dpi. This increased quality gives excellent contrast and crispness and adds a professional edge to graphics printing. Benefits offered by using laser printers are usually in the form of

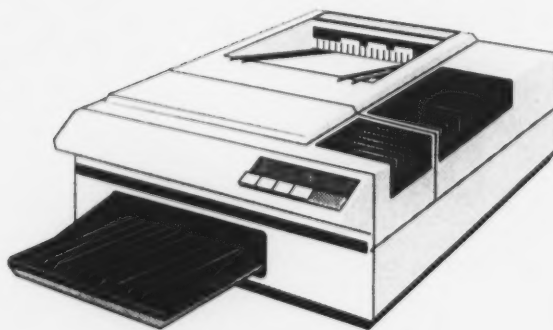
increased printing speed and the ability to produce very large print using scalable fonts. Some of the very cheap laser printers are referred to as graphic device interface (GDI) or Windows printers. These printers are designed to work only with Windows software and will not be able to print from DOS based packages.

Prices vary from £317 excluding VAT for a Brother HL-630, to around £969 excluding VAT for an Hewlett Packard LaserJet 4+.

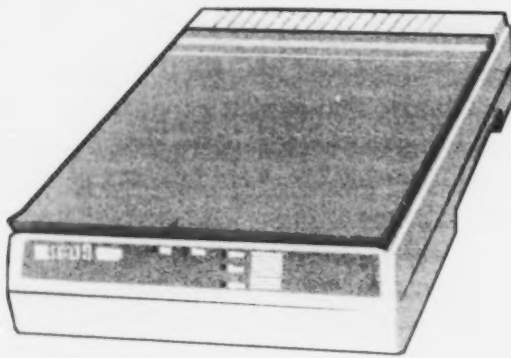
Scanners

A scanner is a device which allows a computer to read information from paper and then display it almost immediately afterwards on its screen. Scanners are used extensively in desktop publishing for incorporating pictures into documents. A picture is placed face down on the glass and the scanner 'scans' it – rather like a photocopier. The picture is converted into a pattern of dots which can be interpreted by the computer. The computer takes this information and then draws the picture on its screen.

An important by-product of this publication process has been the development of optical character recognition (OCR) software. OCR enables the computer to 'read' a page of text which has been scanned; it can then convert it into text which can be used with a word processor and read by a speech synthesiser or displayed with a soft braille line. In effect, the scanner takes a snapshot of the page and the OCR software converts the snapshot into text. In practice, this means that a visually impaired person can take a page of print, place it face down on a scanner, and then listen to it being read back



Laser printer



Flat bed scanner

through a speech synthesiser. Note that a scanner is limited to reading printed text only, and is unable to read handwritten documents.

Scanners can achieve high rates of success in reading text, but not in every case. The success rate depends not only on the quality of the equipment. It depends also on a number of factors such as the complexity of the page layout, the fonts used for the print, whether there are photographs or diagrams on the page and so on. Some texts are notoriously difficult to decode, such as certain highly illustrated school text books. Although scanning technology has much to offer, it remains only a partial solution to access to print. Scanners come in three main kinds: hand scanners, flatbed scanners and dedicated units for handling print. Hand scanners are rolled manually over the text or picture; they pick up the page using a thin row of sensors under the roller unit. Flatbed scanners, on the other hand, behave in a similar way to a standard photocopier. The text is placed on the top of the scanner and the scanner takes a picture of the page for the computer. Dedicated units are used for scanning text and converting it into

another medium, such as speech or tactile display.

Scanners and their dependent software are available almost exclusively for PC and Apple Macintosh computers. If a scanner is to be used for a visually impaired person then the computer chosen must be capable of running a speech synthesiser too. It is possible to buy scanning components separately from the computer or to purchase an integral system. An integral system is a PC, packaged with a scanner, OCR software, an inbuilt speech synthesiser and talking menu system. Other systems provide speech output from print but are more integrated and do not have a monitor, for example the Kurzweil Personal Reader. See Chapter 5 for more details on scanners.

Prices vary from £765 excluding VAT for OCR system with Recognita and scanner (internal system), to £4,495 excluding VAT for the Kurzweil Personal Reader Model 20.

CD-ROM

CD-ROM (Compact Disc – Read Only Memory) is now a well established medium for holding large quantities of computer data on a cheap and reliable plastic compact disc. CD-ROM's high capacity storage is a powerful medium for multimedia and for storing large quantities of information such as encyclopaedias. The discs themselves look identical to audio compact discs; however, CD-ROM discs store text, and pictures, animations and video as well as sound.

CD-ROM is a fairly slow medium for data transfer compared to a hard disc drive. However, there is strong public enthusiasm for CD-ROM and sales are



high at the time of writing. Developments in drive design are moving along at a fast rate. The drives have moved from single speed to quad speed in less than three years. A quad speed CD-ROM drive is considered to be acceptable for today's applications.

Unless you plan to use only text based CD-ROMs, like some of the older encyclopaedias, make sure your computer is upgraded for sound. A good way to do this is to purchase a multimedia upgrade kit. The kit will provide you with a CD-ROM, a sound card with CD-ROM interface and loudspeakers. Often you can buy CD-ROMs at discount prices when you purchase the upgrade kit.

The Department for Education and Employment has invested heavily in supporting CD-ROMs in schools and there is an increasing number of worthwhile discs available for use in the curriculum. These discs are potentially of great benefit to learners and several schools with visually impaired students are developing expertise in this area. However, problems with the choice of operating system are emerging; more and more publishers are moving to graphical user interfaces, such as Windows. Speech synthesisers find it challenging to function in these environments, much preferring the older DOS operating system.

Prices vary from about £120 excluding VAT for a CD-ROM drive (quad speed).

Special access systems

Some visually impaired children cannot access a computer using a standard qwerty keyboard. Special access systems have been developed to assist here.

These systems are designed for users who have varying degrees of motor control; they make use of joysticks for a more able user, switches of various kinds for users who have minimal physical co-ordination, and voice input systems for users with clear speech but severe motor difficulties.

The variety of equipment available in this area would require a directory in its own right. If you need further information on switch systems, the following contacts can help:

Brilliant Computing

Cambridge Adaptive Communications
Foundation for Communication for the Disabled

Don Johnston Special Needs
TFH (Toys for the Handicapped)
ACE/ACCESS Centre (Oldham)
ACE Centre (Oxford)

For addresses of these organisations see the Information and support section and Suppliers' directory.

Overlay boards

An overlay board – popularly called a Concept Keyboard – is a flat touch-sensitive A4 or A3 tablet. It is designed to be an alternative (or supplementary) keyboard to the standard qwerty one issued with the computer. The overlay board is connected to the computer and the child uses it by pressing on its surface. Areas of the overlay board can be programmed to send text, pictures or sounds to the computer. The board is used with a paper overlay (or similar) with which the child interacts. This tablet has proved to be very popular with teachers – especially in primary



and special needs classrooms. A teacher can design overlays – with an overlay editor – and use a program in a way that meets the needs of an individual child. Perhaps because it is easy to design customised materials, the overlay board has become very appealing to many teachers.

Concept Universal

The Universal comes as an A4 or A3 sized board with 128/256 programmable cells; it connects to the serial port (or user port) of your computer. The board is designed for easy connection to most types of computer; the same board works with all, simply attach the lead appropriate to your make of computer. The Universal is a flexible device for schools which have more than one kind of computer in their classrooms. *Price* £129 excluding VAT (A3 including cable) from SEMERC and the Concept Keyboard Company.

Informatrix

This new, high resolution keyboard has 4,096 individual areas, making it ideal



for irregular overlays, map work and beautiful picture overlays. Informatrix connects through the serial port. It comes supplied with the appropriate lead for use with Acorn computers. Informax – overlay designer (price £25) – is needed to create overlays. *Price* £149 excluding VAT from SEMERC.

Oldham Overlay Keyboard

This is available only in A3 and has some features for special needs users. It is particularly robust and has both audible and visual indication when a key

Overlay boards

Board	Size	Computers supported	Supplier	Price
Concept Universal	A3	Acorn, Apple Mac, IBM PC compatibles	SEMERC and Concept Keyboard Co.	£129
Concept Universal	A4	Acorn, Apple Mac, IBM PC compatibles	SEMERC and Concept Keyboard Co.	£119
Informatrix	A3	Acorn	SEMERC	£149
Oldham	A3	Acorn, RM Nimbus	SEMERC	£119
Cable			All suppliers	£12
Nomad	A3	IBM PC compatibles	Queen Alexandra College	£850



is pressed. The overlay keyboard can also function as a single switch interface box, allowing access to a wide range of switch software.

Price £119 excluding VAT (including cable) from SEMERC.

The Nomad – (PC)

This device is fairly unique and difficult

to classify. It is included in this section because most users would use it with a PC and its size makes it less portable. It is a touch sensitive tablet with in-built speech which allows a blind person to read tactile graphics.

Price £850 excluding VAT from Queen Alexandra College.

THE CD-ROM SLOT

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- ☐ Access information to a wide range of resources including dictionaries and encyclopaedias
- ☐ Advice given on choosing educational, professional and leisure CD-ROMs

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**This service is supported by the Blatchington Court Trust,
the University of Birmingham and
Royal National Institute for the Blind.**



Chapter three

Large display systems

John Lodge and Jason Arthurs



Introduction

This chapter deals with ways of displaying text which can assist a partially sighted person when reading and writing.

A noticeable feature of information technology is that it usually presents text on a screen rather than on paper. Unlike paper, which relies upon reflected light to make text visible, a screen is a light-emitting source and is usually easier to see for a partially sighted person (laptop computer screens to a lesser degree).

Besides offering a new display medium, technology can improve the visibility of text in other ways. Computer programs can provide extensive control over the presentation of text on the screen and this can be used to advantage to assist

legibility. Text size, for example, can be enlarged or the foreground and background colours can be changed to provide optimal legibility for an individual reader. Letter shapes can be modified by selecting from a range of typefaces provided by the computer application. Finally, monitors allow the colour, contrast and brightness of the screen to be altered to suit individual preferences. Taken together, the features above represent a powerful battery of access features for the partially sighted user.

Large text on screen

The purchase of a large computer monitor might on initial consideration seem the most practical solution to enlarging text on a screen. Although a large monitor enlarges the size of the text, there are drawbacks to its use. Apart from the physical discomfort a large screen can cause, it is not a cheap solution – a large monitor can cost as much as £1,500. A cheaper alternative is to purchase a PC card that lets you use a standard TV as the monitor.

However, there are other ways of achieving enlarged text on a screen. Some word processing packages, for example, display text in larger than 'normal' size as a standard feature. In addition magnification programs exist, which enlarge the display of text-based



programs. Some of these magnification products consist of software only, while others use a plug-in circuit board (or card) which is inserted into the computer. Most text magnification programs need to be customised to run successfully with a specific application. Before you purchase, do check with your supplier that this can be done and that the necessary environment file is supplied.

Another way of producing large text on a screen is to use a small TV camera attached to a television screen. A large range of products, known collectively as CCTVs (Closed Circuit Televisions), are made especially for visually impaired readers. Using a CCTV, any text can be placed on the reading table directly below the camera and magnified up to about 75X or thereabouts on the television screen. CCTVs can be colour or monochrome and come with extra features such as the ability to display a negative image or to blank out unwanted parts of the screen. A CCTV can support the user in both reading and writing.

In our experience colour models are the most popular for a visually impaired user integrated into a mainstream group. This is because all students in the class can

make some use of them, for example to magnify biological specimens. A TV camera mounted onto a microscope can also be very useful for partially sighted learners in science subjects and is much appreciated by sighted peers. Note also that some CCTVs work with a computer; this can be a useful feature in certain circumstances. See page 34 for more information on CCTVs.

Potential snags

More and more commercial software is being written with a graphical user interface (GUI) where meaning is represented on screen by small pictures called icons. The user selects an icon to tell the computer what action is to be taken. This development in software design presents visually impaired users with additional difficulties in scanning the screen and recognising the icons. Many of the magnification packages only work with one specific operating system, such as DOS, Windows or System 7. It is therefore advisable to make sure you get the right version for the software you intend to use, because a DOS magnification package will not work with Windows software. See Chapter 5 for details on magnification software.



Large print word processors

A 'large print' word processor is one which displays text much larger than 'normal', for example in 12 point. There are several large print word processing packages that partially sighted users find useful. When choosing a word processor, it is important to know which



Large print word processors			
Computer	Package	Supplier	Price
IBM compatibles	Big Mac	CENMAC	£55
IBM compatibles	WriteOn Plus!	SPA	£39
IBM compatibles	Eye Relief	Cambridge Adaptive Communications	£115
IBM compatibles	Flexiwrite 1	Flexible Software	£39
IBM compatibles	Flexiwrite 2	Flexible Software	£39
RM Nimbus PC-186	Flexiwrite 1	Flexible Software	£32
RM Nimbus PC-186	Big Mac	CENMAC	£45
RM Nimbus PC-186	WriteOn!	SPA	£35
RM Nimbus PC-186	Prompt/Writer	RESOURCE	£32
Acorn Archimedes	Full Phases	Northwest SEMERC	£39
Acorn Archimedes	Talk Write	RESOURCE	£59.95
BBC B/Master 128	Wordwise Plus	Watford Electronics	£36

particular computer the learner will use. This is because different computers use different software and what works with one computer will rarely work with another make of computer. The table above lists some of the more popular large print word processors. Although school children make excellent use of these programs, this software is quite limited in its scope. It is only able to enlarge the body text of the document. Menus, dialogue boxes and so on remain at standard magnification. Independent use is therefore not always available to a partially sighted user.

Big Mac – (PC)

Big Mac is a word processor specifically designed for users who have a physical disability, which makes it difficult to use an ordinary keyboard. Users can input information using many different types of switch. Big Mac has several features

that make it potentially useful for learners with a visual impairment. It presents text on screen in either 'big' or 'medium' sizes and these can be set at 'thick' or 'thin'. Text can also be printed out in large size. In addition, the colour of the foreground and background can be changed. Big Mac will also work with a speech synthesiser, for example Apollo or Covox, but not all menus are accessible to a blind user for independent working. Big Mac (PC) also includes the facility to write in European language fonts.

Price £55 including VAT from CENMAC.

Big Mac – (RM Nimbus PC-186)

The Nimbus version of Big Mac has the same features as the PC version described above. However, unlike the IBM version it does not include the facility to write in European language fonts.

Price £45 including VAT from CENMAC.



Eye Relief – (PC)

This word processor is designed specifically to produce large character text on a portable computer screen. The maximum size of the text on screen is bigger than Flexiwrite (see below) and is therefore useful for learners who need text that is bigger than double height and width. All the command menus are also magnified and text is automatically wrapped on the screen, no matter what font size is chosen. If Eye Relief is used on a desktop computer with a colour screen there is a wide range of choice for the text and background colours. You can also alter the spacing of characters and lines on screen. There are some limitations to this program: the default settings mean that the text can only (easily) be printed out in 'ordinary' size; a spelling checker is not included.

Price £115 excluding VAT (laptop version) and £230 (full version) from Cambridge Adaptive Communications.

Flexiwrite 1 – (PC, RM Nimbus PC-186)

Flexiwrite is a word processor that allows the user to view text on the screen up to double height and double width. It also has a spelling checker and many other useful features, including the ability to print out large text up to 70 point (about one inch high). An RM PC-186 Nimbus version is also published and this means that it should be possible to transfer work on disc between an IBM compatible computer and an RM Nimbus. Flexiwrite is reasonably priced and many partially sighted users are happy to use this program on a portable screen.

Price £39 excluding VAT from Flexible Software.

Flexiwrite 2 – (PC, RM Nimbus PC-186)

The updated version of Flexiwrite

includes support for text on screen up to 1" high (72 point), an 80,000 word spell checker, European character support and full support for dot matrix, inkjet and laser printers for optimum output.

Price £39 excluding VAT from Flexible Software.

Full Phases – (Acorn Archimedes)

Very popular with primary school children, Full Phases is a delightful word processor for the Acorn Archimedes series of computers. Full Phases offers large print sizes on screen. It is also possible to add pictures to the text. In addition, this software speaks out text.

Price £39 excluding VAT from SEMERC.

Prompt/Writer – (RM Nimbus PC-186)

This is an updated version of the BBC program of the same name and works with a speech synthesiser. It is supplied with another useful program called Touch Explorer Plus – a popular touch-and-display program for the Concept Keyboard.

Price £32 excluding VAT from RESOURCE.

Talk Write – (Acorn)

The Talk Write program features large clear print which can be adjusted in size and colour to suit particular users. It also has an in-built speech option which can speak letters words and sentences as well as a 50,000 word spelling checker and speech editor to correct pronunciations.

Price £59.95 from RESOURCE.

Wordwise Plus – (Acorn BBC)

Wordwise was one of the first word processors for the BBC computer and was available as a small microprocessor (called a ROM) that is plugged into the computer. Text is presented on screen in



a medium size (40 characters width) – a size that is suitable for many partially sighted users. Wordwise Plus will print in large sizes and talk through a Dolphin speech synthesiser. Talking Wordwise is totally accessible for blind users.

Price £36 excluding VAT from Watford Electronics (Wordwise) – Talking Wordwise is £17 excluding VAT from RCEVH.

WriteOn Plus! – (PC)

A popular word processor targeted at the primary school phase, this program allows the user to write in large text on screen. The program operates by selecting choices from a menu; usefully, the menu text is also double height. A version also exists for the RM Nimbus.

Price £39 excluding VAT from SPA.

WriteOn! – (RM Nimbus PC-186)

A popular word processor targeted at the primary school, this program allows the user to write in large text on screen. The program is largely menu-driven; usefully, the menu text is also double height. A version exists for the PC.

Price £35 excluding VAT from SPA.

Computer magnification systems

Unlike the large text word processors featured in the previous section, none of the magnification programs here are stand-alone products. Rather, they are software programs which enlarge the display of other applications and customise the working environment to suit the individual user. In most cases utilities need to be set up carefully to work properly with, for example, a word processing package. Learning to work a magnification program requires the development of a range of skills which many first time users will not possess; in practice, learners will need careful training in order to use magnification software effectively.

The user starts by loading up the magnification utility. All text on the screen now appears large. Next, the application program is loaded, for example a word processor or database. The application program now appears in enlarged format. Magnification utilities magnify only a portion of the

Software magnification programs		
Computer	Package	Price
Apple Mac	CloseView	Free
Apple Mac	InLarge	£125
IBM compatibles	Lunar 2.0 for DOS	£195
IBM compatibles	Lunar for Windows	£290
IBM compatibles	Magic	£80
IBM compatibles	Visulex LP-DOS	£445
IBM compatibles	Zoomtext	£350
IBM compatibles	Zoomtext Plus	£450



screen at any one time. However, the user can move the magnified 'window' around and read the rest of the screen. The enlargement window is moved by using the keyboard or the mouse.

Note that a magnification utility can sometimes clash with the application program causing your computer to 'hang up'. It is therefore important, prior to purchase, to check with your supplier that the magnification utility will work satisfactorily with the application program you want to use. It is a good idea to ask for a demonstration disc of the program to try out on your computer, before you commit yourself to buying. You can usually request one from the supplier by phone. Your supplier will also be able to sell you 'environment files' for a range of software applications. An environment file customises the way the magnification utility cooperates with a specific application; an environment file aims to make the application comfortable to work with. The *Software Magnification Programs* table on the previous page lists some of the more common magnification utilities for different makes of computer.

There are a large number of magnification utilities on the market, most of them for the PC. A selection of the more commonly used ones are described below. It should be possible to make these programs work with most text-based software:

CloseView – (Apple)

This program is supplied to users on the utility disc. It enlarges a portion of the screen from 2 to 16 times but is probably most useful at 2X magnification because in larger sizes the letters become very ragged and difficult to read.

Price – free with Apple's System 7 operating system.

InLarge – (Apple)

InLarge magnifies from 2 to 16 times like CloseView (see above) but has several extra facilities. It can automatically scan the screen, magnify the whole or part of the screen and can blank out the unmagnified part of the screen to reduce distraction. Apart from Closeview, this is the only full access magnification system available for the Apple Mac.

Price £125 excluding VAT from Alphavision, £149 from Don Johnston Special Needs.

Lunar 2.0 for DOS – (PC)

This is one of the most popular magnification programs for PC compatible computers. It can enlarge characters up to eight times their normal width and height. A built-in word wrap facility, breaks text at the end of each line and displays it in the current window to ease reading. There is also a very useful line view facility which displays the text as a single line which scrolls across the centre of the screen. The magnification window can be moved about the screen using either a mouse or the keyboard. Dolphin Systems who supply Lunar also sell a range of environment files to make Lunar work to best effect with commonly used applications; it is important to order the appropriate environment file at the same time as you order Lunar. A demonstration disc is available on request.

Price £195 excluding VAT from Dolphin Systems and Foundation for Communication for the Disabled.

Lunar for Windows – (PC)

This utility enables the screen of a Microsoft Windows application to be

INTRODUCING ZoomText

Version 5.1

Featuring Support for Windows 95!

ZoomText 5.1 is an easy-to-use software program that magnifies the display of word processors, spreadsheets, databases, on-line services and more... on *your* computer screen.

The new ZoomText 5.1 version supports all current releases of Microsoft Windows, including Windows 95, Windows 3.1 and Windows for Workgroups.

ZoomText 5.1 has been redesigned to support the new user interface of Windows 95. The start menu, taskbar and icons can be tracked on, along with all standard controls.

Support for Windows 95 display drivers has also been added. 16 and 256 colour drivers can be used at any resolution including 640 x 480, 800 x 600 and 1024 x 768. Display resolutions can even be switched while ZoomText is running

All these enhancements come without the hassle of having to relearn ZoomText. Its user interface remains identical to the 5.0 release.

Call today for your free evaluation demo disk

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enlarged up to eight times normal size. Lunar for Windows can automatically follow the mouse pointer, with selectable scroll margins and scroll speeds. Other features include automatic following of menus, dialogue boxes, text entry cursors and keyboard focus.

Note that the price includes a copy of Lunar 2.0. Dolphin will supply a demonstration disc on request. You can purchase a combination package of Lunar 2.0 and Lunar for Windows for £350.

Price £290 excluding VAT from Dolphin Systems and Foundation for Communication for the Disabled.

Magic – (PC)

This program can be purchased at two 'levels'. Magic is a simple magnification utility giving enlargement of 2X; it works with DOS and Windows. A demonstration disc is available so you can try before you buy. Magic deluxe permits further magnifications to 12X (DOS) and 8X (Windows), but it costs three times the price.

Price £80 excluding VAT and £234 excluding VAT (deluxe version) from Foundation for Communication for the Disabled.

Visulex LP-DOS – (PC)

LP-DOS offers six magnification sizes ranging from two to nine times in three different fonts (Gothic, Times and Times Bold). The shape and colour of the cursor can be changed to suit the user. Foreground and background colours can be changed independently of the application that you are using it with. It also works with MS-Windows and Windows 95.

Price £445 excluding VAT from Alphavision.

Zoomtext Plus – (PC)

Zoomtext Plus will magnify MSDOS,

Windows 3.1, Windows for Workgroups and Windows 95. Text and graphics can be magnified from 2 to 16 times and has a choice of fonts including a smooth font – this smooths out the rough edges of magnified letters which appear 'jagged' in larger sizes. The user can choose to have the whole or just part of the screen magnified.

Price £450 excluding VAT (ZoomText Plus DOS & Windows), £350 excluding VAT (ZoomText for DOS only) and £350 excluding VAT (ZoomText for Windows only) from Sight and Sound Technology and Foundation for Communication for the Disabled.

Magnification system (hardware)

The following magnification system requires a slot inside the computer to plug in an extra circuit board. It will only operate with a PC desktop system.

Vista – (PC)

This is often considered to be the deluxe magnification system for PC compatible computers. It uses a mouse to navigate around the screen and the various options include: magnification from 3 to 16 times, six ways of displaying enlarged text (including single line display) and the ability to share a screen with a CCTV, for example the Vantage (see later in this chapter). The Vista completely replaces the graphics system of the computer, so it will work with virtually any graphics program including MS-Windows, and because it is operated using its own mouse it avoids possible keyboard clashes with other programs.

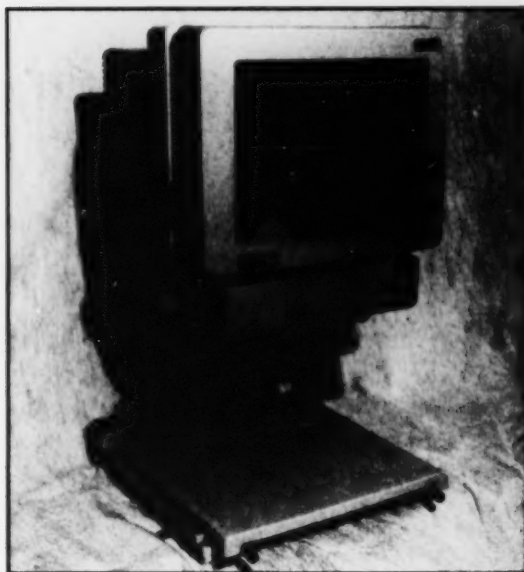
Price £2,395 excluding VAT from Sensory Systems.



Closed circuit television systems

A typical closed circuit television (CCTV) system consists of a television camera mounted above a moving platform; the material to be magnified – usually text of some kind – is placed on the platform directly below the camera. Situated above the camera is a television monitor which displays a magnified image of the material on the platform. The user moves the platform so that the camera can scan the material. Very high magnifications are possible with a CCTV (up to 75X), but it can take time to master the technique of reading with a CCTV – said to be similar to using a microfiche reader. Note that some models of CCTV support handwriting and typing in addition to reading.

Some newer models of CCTV use a hand-held camera in order to make the device more portable (they are marked with an asterisk in the *Closed Circuit Television Systems* table on the next page). However, reading with a hand-held camera is more difficult than it is with the larger static CCTVs.



There are many different CCTVs on the market and the table on page 35 gives prices for several of them. Prices vary considerably depending upon whether you choose a colour or monochrome model and how many extra facilities you require.

Features to look for include:

- ☐ colour or black and white screen
- ☐ wide depth of field so that objects, as well as text, can be viewed
- ☐ screen tilt to ease reading
- ☐ positive/negative image reversal (that is to make black text on white paper appear as white text on a black background)
- ☐ choice of colour for text and background
- ☐ moveable windows to blank off unwanted parts of the screen
- ☐ computer connection facilities
- ☐ handwriting/typing facilities
- ☐ portability
- ☐ automated viewing tables.

It is not within the scope of this guide to describe all the CCTVs on the market. A representative sample has been chosen to illustrate some of the features.

Aladdin

This fully self-contained unit consists of a compact monochrome desktop CCTV with an integral monitor and reading table. Available in monochrome only.

Priced £1,295 excluding VAT from Sensory Systems.

Aladdin Pro

Features as the Aladdin, with the addition of horizontal and vertical line markers and an enhanced heavy duty reading table.



Closed circuit television systems			
CCTV	Colour/Mono	Desktop/Portable	Price
Aladdin	Mono	Desktop	£1,295
Aladdin Pro	Mono	Desktop	£1,595
Chroma Plus	Both	Desktop	£1,950 to £2,250
Delta Loupe*	Mono	Portable	£2,395
Eezee Reader*	Mono	Portable	£280
EMAG*	Mono	Portable	£2,195
Magnilink 609	Colour	Desktop	£1,995
MAX-Eye	Mono	Portable	£1,325
Portable Eezee Reader*	Mono	Portable	£590
Pulse Data Viewpoint*	Both	Portable	£1,355 to £1,755
Scantec Angle-Scan	Both	Desktop	£475 to £875
Smartview	Both	Desktop	£1,470 to £1,700
Tagarno CCD	Mono	Desktop	£1,890 to £2,950
Tieman Reader	Colour	Desktop	£2,195 to £2,426
Traveller II	Both	Portable	£995 to £1,995
TV Reader*	Mono	Portable	£275

Priced £1,595 excluding VAT from Sensory Systems.

Chroma Plus

This colour CCTV is supplied either with a 14" (35.5cm) or 20" (50.8cm) monitor and offers magnification up to 60X. It is available with a movable reading table and positive/negative image reversal.

Price £1,950 excluding VAT for 14" (35.5cm) and £2,250 excluding VAT for 20" (50.8cm) from Sensory Systems.

Delta Loupe

This portable monochrome flat screen CCTV has a magnification range from 8 to 20X. A small hand-held camera rolls over paper. The main unit houses a 9"

(22.8cm) screen with contrast and brightness controls; the user can choose between enhanced monochrome or an image which contains shades of grey. *Prices from £2,395 excluding VAT from Concept Systems.*

Eezee Reader / Eezee Writer

The Eezee Reader is a low cost, lightweight device with a hand-held camera that plugs into any standard television. Magnification varies from 18X on a 14" (35.5cm) television to 35X on a 27" (68.5cm) TV. It is a monochrome device which offers black on white or white on black. Like similar hand-held cameras, it tends to be a little more difficult to use than a fixed camera with a reading table. At the time of

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writing Eezee Writer is about to come on the market. This small device enables handwriting to be magnified on a TV screen. A flexible stand allows the user to carry out two-handed operations such as needlework or model-making.

Prices £280 (Eezee Reader) and £375 (Eezee Writer) excluding VAT from Force Ten Company and Concept Systems.

EMAG

This portable CCTV weighs only 8lbs (3.6kg) and is supplied with a carrying case. It is mains or battery operated and uses a small hand-held camera. An orange magnified image is presented on a small black screen and magnification is up to 20X. The EMAG can be plugged into an external monitor. Inevitably, the small size of the device means that it only presents a tiny part of text at any one time; this can make the EMAG more difficult to use than a full size CCTV. In particular, it takes the reader longer to scan through a document to find a particular sentence. However, if portability is an important requirement, this device might well be worth considering.

Price £2,195 excluding VAT from Sensory Systems.

Magnilink 609

This product is a desktop colour CCTV with 4X to 45X magnification. It has a 14" (35.5cm) colour screen which can be tilted for greater comfort. An optional 21" (53cm) screen is also available. The Magnilink 609 offers a host of features but of special interest is its wide field of focus. This means that solid objects can be placed under the camera for enlargement, as well as print.

Price £1,995 excluding VAT from Professional Vision Services.

MAX-Eye

This is a portable CCTV which incorporates camera and display in a single unit. The user places the device on the surface of the material to be viewed and slides MAX-Eye in any direction. Rollers on the bottom of the unit make it glide smoothly; the rollers are designed so that horizontal movement produces less friction than vertical does; this assists tracking when reading.

MAX-Eye can be run off both mains and battery and magnifies at 6X or 13X.

Prices £1,325 (mains only) and £1,625 (with power pack) excluding VAT and delivery from Visualeyes.

Portable Eezee Reader

The Portable Eezee Reader is a low cost portable CCTV system weighing only 9lbs (4kg) and featuring a hand held camera and a self contained 7" (17.8cm) screen. It works from both battery and mains power and is capable of 10X magnification in both black on white and white on black. As an optional extra a padded carrying case is available.

Price £590 excluding VAT from Force Ten Company.

Pulse Data Viewpoint VGA

This is a 'semi-portable' (weighing 12 kg/26lbs) monochrome system with a hand-held camera, a compact 14" (35.5cm) display and automatic contrast control. It can magnify up to 40X and has a window facility to blank off parts of the screen. Note that some users might find a hand-held camera more difficult to use than a reading table. A handwriting adapter is available for an extra £310. This CCTV also has PC access and a range of features including colour, split screen, text and background colour control.

Prices from £1,355 (reading model) and £1,755 (PC model) excluding VAT from



Concept Systems, Foundation for Communication for the Disabled and Pulse Data International.

Scantec Angle-Scan

This budget-priced CCTV has a camera on the end of a desktop stand, with an elbow which allows the camera to be pointed in almost any direction. It plugs into a standard TV and features a negative image function with variable magnification.

Prices £475 (black & white) and £875 (colour) excluding VAT from Scantec

Smartview

This desktop CCTV unit goes beyond providing straightforward magnification by introducing an optional keypad which gives large print clock, calendar and calculator options on screen in addition to the normal camera input.

Prices from £1,470 (camera only) to £1,700 (semi-colour option); the intelligent keypad is an extra £175. All prices excluding VAT from Pulse Data International.

Tagarno CCD

This desktop CCTV has an A3-sized reading table. Features such as underlining and image polarity reversal are standard; others can be purchased at extra cost, for example an anti-glare shield.

Prices from £1,890 (Mono) and £2,950 (colour) excluding VAT from Pulse Data International.

Tieman Reader

This CCTV offers a wide range of facilities including black/white, green, amber and colour versions. It can magnify from 3X to 40X and has a reading table and a negative/positive image reversal switch, together with underlining and windowing. The

Tieman has hydraulically assisted height adjustment on the camera and an integral typing mirror. The latter allows a typewriter to be placed on the reading table and it is also possible to handwrite under the camera.

Price £2,195 excluding VAT with 15" (38.1cm) colour screen from Concept Systems.

Traveller II

This is another 'semi-portable' CCTV weighing 17.5lbs (8kg) without the screen. It comes with a reading table, variable magnification, from 3 to 60X, windowing facilities and positive and negative image switching. It can be plugged into any television set, monochrome or colour, as well as any video monitor.

Prices from £995 excluding VAT (not including a screen) from Alphavision.

TV Reader

The TV Reader is a portable CCTV designed to magnify text using your own TV. The hand-held camera has rollers to assist with scanning the text.

Price £275 excluding VAT from Horizon CCTV.

Large print (paper)

Some of the computer magnification systems above will allow text to be printed out on paper in a range of font sizes. The quality of the print depends largely upon the type of printer used, but budget-priced inkjet and laser printers are now widely available. Such printers produce crisp text with good contrast. It is not difficult to produce large print for use by a partially sighted person using a word processor and a laser printer, for example Lunar with WordPerfect. Respectable large print can also be obtained, albeit



slowly, with a 24 pin dot matrix printer using software like Word for Windows.

Photocopiers

Another practical, but less technical way, of producing large text on paper is to use the enlarging facility on a photocopier. Many text books are about A5 size and an enlargement to A4 will often provide enough assistance for the partially sighted

learner to read the text. However, most teachers' handouts are probably of A4 size and enlargement to A3 size will usually be required. A3 paper does mark out the visually impaired learner in a mainstream setting and some pupils may be rather self-conscious about using oversize paper. There can also be difficulties in managing the storage of A3 sheets and following lines of text which fill the whole width of A3 paper.

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Chapter four

Braille systems

Max Hampson



Introduction

This chapter describes technology devices that are used by brailleists and those who want to produce braille for blind people. Braille displays, computers with braille keyboards, braille printers and braille/print

translation software are described in the sections below.

What is braille?

Braille is a medium which allows a non-sighted person to read text by touch; it is also a method for writing tactile text. The braille code is physically presented as raised dots, usually arranged in 'cells' of up to 6 dots (⠠). This is why braille writing devices have six main keys – each key controls a dot in the braille cell.

The basic code is called grade 1 braille; it is a direct substitution of normal print letters with letters from the braille alphabet. The braille alphabet is as follows:

⠁	⠃	⠉	⠇	⠑	⠋	⠎	⠚
a	b	c	d	e	f	g	h
⠇	⠛	⠊	⠡	⠍	⠞	⠏	⠕
i	j	k	l	m	n	o	p
⠗	⠘	⠥	⠦	⠣	⠤	⠨	⠩
q	r	s	t	u	v	w	x
⠹	⠺						
y	z						

The braille alphabet

Word	Grade 1	Grade 2
of	⠠⠠⠠	⠠⠠
for	⠠⠠⠠⠠	⠠⠠
and	⠠⠠⠠	⠠⠠
knowledge	⠠⠠⠠⠠⠠⠠⠠⠠	⠠
compartment	⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠	⠠⠠⠠⠠⠠⠠
difference	⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠⠠	⠠⠠⠠⠠⠠⠠

A comparison of words in grade 1 and grade 2 braille

In practice, most braille users do not employ grade 1; they use grade 2. Grade 2 is a shorter form which makes reading and writing braille much faster. Above are a few examples which demonstrate some of the differences between grade 1 with grade 2 braille. Note that considerably less space is needed for grade 2. It can take several months to learn to read and write in the grade 2 code. A competent writer of braille has a speed advantage over the person who handwrites or types conventional text, since braille is a faster recording medium.

Why use technology?

A blind student who cannot read or write text by sight, uses speech and touch for communication and learning. Many blind children learn to use braille as their principal means of reading and writing. Usually children learn to braille with a mechanical braille first. However, as a child gets older the traditional mechanical braille is often complemented or replaced by an electronic note taker.

Technology is providing new opportunities for learning and communication. For example, it can assist with writing and storing information in braille. Electronic braille note takers provide word processing facilities which enable the learner to create and edit text in braille.

New technology also has the power to switch the medium of communication. Braille information, for instance, can be stored electronically in a computer. This same information can then be made available as synthetic speech, or refreshable braille (overleaf), or large print and so on. The choice is the user's and can be made to suit an individual need.

The production of braille text and tactile diagrams is an important part of a teacher's work in preparing curriculum materials for use by blind children. Technology can help significantly with this task. Schools need to produce books and worksheets in braille in order to support a blind child.

This essential task is time consuming and expensive using mechanical methods. However, technology has the ability to speed up braille production considerably.

Categories of braille device

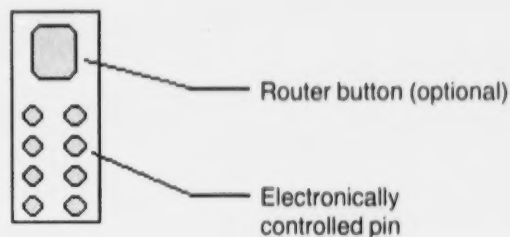
A bewildering range of braille devices is on the market, which are not easy to categorise. In this chapter devices are grouped into:

- ☐ electronic displays which use soft braille;
- ☐ braille note takers with either mechanical or electronic keyboards
- ☐ qwerty keyboard note takers
- ☐ braille embossers
- ☐ translation software for braille
- ☐ tactile diagram production machines.

Electronic braille displays

A standard computer uses a monitor to display information provided by a program. How does a blind student gain access to this information? Two common technologies supply feedback for the blind user: speech and braille. In the case of speech, the screen's contents are read out to the user through a loudspeaker or headphones. A braille display, on the other hand, 'reads' off the screen, line by line, and presents the information on a refreshable braille

device. Braille displays are discussed here and speech is dealt with in Chapter 5.



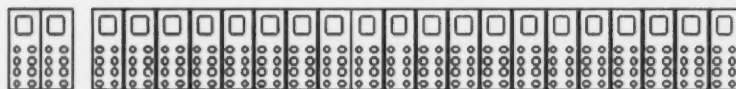
The anatomy of a soft braille cell

What is a braille display?

A braille display is a tactile device consisting of a row of special 'soft' cells. A soft cell (see diagram above) has 6 or 8 pins made of metal or nylon; pins are controlled electronically to move up and down to represent characters as they appear on the display of the source system – usually a computer or braille note taker. Soft braille cells have either 6 or 8 pins depending on the model. Advanced braille code has 8 dot braille, but most users will probably only use the 6 dot code. Dots 7 and 8, if present, can be used to show the position of the cursor in the text. They can also be used for advanced mathematics and for computer coding.

Some braille displays also have a router facility. A router button (or sensor) controls the position of the text cursor;

press on the router button of a cell and the cursor moves directly over that letter in the text. Soft braille cells are combined in a line to make up a braille display (see illustration left). The number of



Twenty cell soft braille line with two status cells

cells in a braille display has been designed by manufacturers to suit the text modes of computer screens. This is because an important application of braille displays is to provide access to computer text. Full-size braille lines are 80 cells long – this matches the number of characters across the width of a typical word processor screen. Braille lines with less than 80 cells cope with an 80 character print line by displaying it in stages, for example a 20-cell line would display it in four stages. This is not ideal, but smaller displays are much cheaper than 80-cell lines, so are a more affordable purchase for many users. Note that portable computers use the small braille displays.

Some braille displays have status cells adjacent to the main display. These cells supply extra status information about the application in use, for example row and column number or cursor position.

Braille displays are sometimes packaged within other devices, for example as part of a note taker like the Braille Lite; or

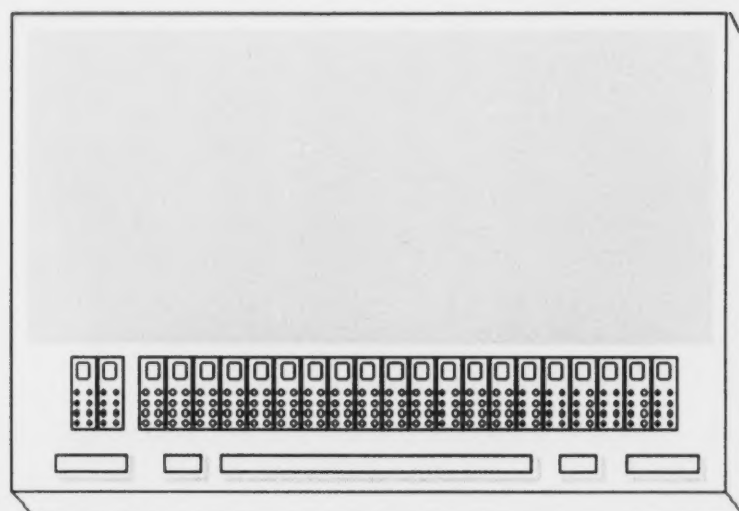
they can be constructed as display units for connection to a computer or another device. A soft braille unit is built as a shallow box so that a standard qwerty keyboard or laptop computer can be placed upon it. The unit is provided with cables and appropriate software so that it can be connected to the host device. A braille display usually has buttons built into it; these give the user further control over screen navigation (see the picture below).

Braille display units

This section deals with soft braille lines only, that is those which are designed to fulfil a display function only. Such displays come in many sizes offering a range of features.

ALVA Braille Terminals

ALVA is a Dutch company which makes products for people with visual, aural or physical disabilities. Three versions of braille line are made: a 20-cell, a 40-cell and an 80-cell model. All of them have cursor routing; touch a button above any braille cell and the cursor automatically



Soft braille display unit

Stand-alone braille displays				
Device	Cells	Dots	Cursor routing	Price
Alva ABT-20	20 plus 3	8	yes	£2,200
Alva ABT-40	40 plus 3	8	yes	£4,500
Alva ABT-80	84	8	yes	£7,900
Braillex-1B 40 CR	40	8	yes	£7,695
Braillex-1B 40/40	80	8	yes	£8,995
Braillex-2D	80	8	yes	£12,695
CombiBraille 25	20 plus 5	8	no	£2,375
CombiBraille 45	40 plus 5	8	no	£4,850
Powerbraille	40	8	yes	£5,795

goes to that location. A very useful feature of the Alva braille lines is their ability to speak prompt commands. Many blind people find that the combination of speech and braille line together enhances reading and comprehension. The 20 and 40-cell models can run on rechargeable batteries so can be used with a laptop computer independently of mains electricity supplies.

Prices £2,200 – £7,900 excluding VAT from Professional Vision Services.

Braillex-2D screen

This sophisticated unit displays the structure of the computer screen by using two soft braille lines: a horizontal one with 80 cells and a vertical one with 22 cells. This helps the user to negotiate the screen layout more easily. The Braillex-2D screen can be used with Windots software which allows the user access to Windows.

Prices £12,695 excluding VAT from Alphavision.

CombiBraille 45

This unit has a qwerty keyboard with

integral braille display for use with a laptop. It has a 40-cell 8 dot display with 5 additional status cells giving details of the cursor location and other information. The built-in Juno speech synthesiser and dedicated screen reader come with pre-set configuration files for many popular applications, and others are available on request. The unit also supports Winvision and Windows Bridge screen readers.

Price £4,850 excluding VAT from Concept Systems and Hagger Electronics.

CombiBraille 25

The CombiBraille 25 has the same basic features as the CombiBraille 45 (see above) except that it has 20 display cells and no speech synthesiser. It is designed for use with palmtop computers.

Price £2,375 excluding VAT from Concept Systems and Hagger Electronics.

Powerbraille

This unit is a replacement for the smaller versions of the Navigator. It has a 40-cell soft line with 8 extra cells for

status information. Powerbraille offers a suite of software which allows most DOS program screens to be displayed. This portable device which weighs just under 3lbs (1.3kg) is designed to sit underneath a laptop computer.
Price £5,795 excluding VAT from Sensory Systems.

Braille note takers

Many devices exist for writing braille. A keyboard is needed (usually) to braille in text and this section classifies note takers according to the kind of keyboard used. There are note takers with mechanical braille keyboards, others with electronic braille keyboards and others again use a standard qwerty keyboard.

Mechanical braille keyboards

This section deals with mechanical brailers and other specialist devices which are used for note taking and similar activities. RNIB is the main UK supplier for most of the braille devices listed here. A two-tier pricing policy is in operation for this equipment: there is a concessionary price for visually impaired people who are paying from their own funds. This concession also applies to some local voluntary societies for blind people and employers buying essential equipment for a visually impaired employee. Those people or groups not in these categories pay the full price. Note that the higher price quoted includes VAT.

Braille shorthand machine

This device is designed to take shorthand at up to 140 words per minute. Weight 2.9kg.

Price £212 including VAT
 (concessionary price £180 excluding VAT) from RNIB.

Erica 500 braille writer

This is a rather old fashioned braille writing machine which produces 31 characters per line, 30 lines per page and weighs 6kg.

Price £358 including VAT
 (concessionary price £131 excluding VAT) from RNIB.

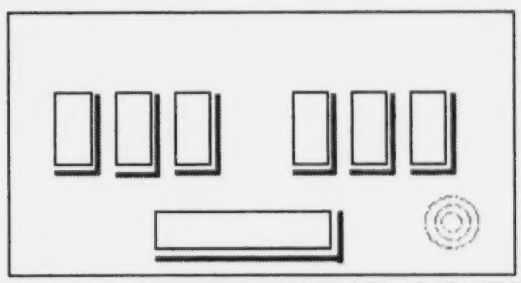
Perkins brailler

This classic and much used machine is as popular as ever. Very robust and reliable, modern technology has by no means made it obsolete. It will take braille paper of various sizes. There are many variants of the basic machine – see the RNIB Braille product guide. Note that there is an add-on for the Perkins called Braille-n-Print which permits it to be connected to an ink printer.

Price £492 including VAT
 (concessionary price £191 excluding VAT) from RNIB.



Electronic braille keyboards



Electronic note taker

This section covers note takers with electronic braille keyboards; these devices have a keyboard which supports the typical layout for typing braille, that is six keys and a space bar (see illustration above). These machines are essentially braille computers. They tend to be light and portable and make use of speech and/or braille to provide read back facilities. The small size of these note takers is because they use a braille keyboard and have no screen (a blind person does not need one). This means that a smaller battery can be used, thereby reducing weight. It is, however, quite possible to connect many of these note takers to a computer which enables a sighted person to read the text being brailled – a useful feature in the classroom at times.

The qwerty keyboard is the one used in the business world and it is certainly advantageous (for later employment) to become proficient in its use. There is often a dilemma in education about whether to use a note taker with a braille keyboard or a qwerty keyboard – or even both! The solution to this problem usually depends on the needs, abilities and experience of the learner. What is best for an individual child is therefore a matter of judgement.

ALVA Braille Carrier

Physically, the ALVA Braille Carrier consists of four items: a 40-cell braille line, a braille keyboard, a mini qwerty keyboard and a liquid crystal visual display. This device has a multi-function role. A blind user can braille in text and it can be read back by touch, using the braille line. ALVA has its own built-in word processor. Alternatively text can be entered using the rather small qwerty keypad and a sighted person can read the entered text on the visual display. The same text appears simultaneously on the braille display for a blind person. The visual display also shows text that is being entered from the braille keyboard. All this sounds complicated but, in effect, this multi-mode facility allows a sighted and a deafblind person to communicate with each other. Other features of the ALVA Braille Carrier include calculator, spreadsheet, diary and address book. The device will fit easily into a small briefcase.

Prices from £3,995 excluding VAT from Professional Vision Services.

Aria

This portable palmtop computer has speech output and a braille keyboard. Aria runs in DOS and comes with built-in programs, including a word processor, clock, calculator and diary. Sockets are provided enabling Aria to be connected to a printer/embosser or a computer. The Aria is also fully DECtalk Express compatible, so can be used as an external speech synthesiser for a PC with appropriate screen reading software.

Price £1,515 excluding VAT from Techno-Vision Systems.

Braille Lite

This new note taker is essentially a Braille'n Speak (see below) with an

Braille keyboard devices				
Device	Size (cm)	Weight (kg)	Output	Price
ALVA Braille Carrier	30x26x5	2.9	braille, visual	£3,995
Aria	22x10x2.7	0.5	speech	£1,515
Braille Lite	21x13x4	1.0	braille, speech	£2,995
Braille-n-Print	35x17x3	0.8	braille	£625
Braille 'n Speak 640	20x10x3	0.5	speech	£1,095
Braillex Compact	29x22x6	3.5	braille	£8,765
David	35x25x6	3.4	braille, speech	£8,500
Eureka A4 advanced	29x21x4	1.6	speech	£1,815
Mountbatten	45x24x9	4.3	braille	£1,395
Notabraille	23x5x3	1.0	braille	£4,565
Pioneer	19x14x5	0.65	speech	£595

added 18-cell braille display. The braille line enhances the note taker considerably.

Price £2,995 excluding VAT from Sensory Systems.

Braille-n-Print

This device connects a standard Perkins braille to an ink printer. Text brailled into the Perkins appears simultaneously as print on the ink printer. The Braille-n-Print can cope with most common situations, including basic braille maths and more specialised applications like foreign languages in Grade 1 braille. The latest Braille-n-Print (Slimline model) is more compact than earlier versions and fits snugly under a Perkins braille. It can be used without a printer being connected – text is stored and the user can print off later. Almost any printer with a parallel interface can be used. Printers with serial interface require an adapter.

The Braille-n-Print is used widely in primary schools where this fairly bulky system does not need to be carried around from classroom to classroom. Indeed, Braille-n-Print has become something of a 'standard' tool for educationally blind children. The pupil brailles away on the Perkins, producing a standard braille copy on paper, while the ink printer simultaneously makes its print copy. In a classroom situation, this allows a teacher (and other pupils) immediate access to a blind child's work. This can be a great asset for social integration. *Price* £625 excluding VAT from Concept Systems.

Braille'n Speak 640

Braille'n Speak 640 is a pocket-sized braille note taker/word processor and is one of the smallest braille keyboard computers on the market. Text is read back to the user by synthetic speech through a loudspeaker, or through headphones to avoid distracting others.

Several files can be stored in the memory and further files can be saved on a 3.5" disc using the optional disc drive. Once saved, these files can be loaded into a PC computer, and into an Apple Macintosh computer if a file exchange program is installed. The Braille'n Speak has other programs including a calendar, clock, calculator, talking computer terminal, note organiser and a telephone directory. Text written with the Braille'n Speak can be printed off in either ink or braille. The device has its own built-in grade 2 braille translator. A serial interface ink printer is needed; if you have a parallel interface ink printer, you need a serial to parallel converter cable. *Price* £1,095 excluding VAT from Sensory Systems.

Braillex Compact

This is a braille output portable computer with a 486DX4 or Pentium processor, 4Mb RAM, 500Mb hard disc and 3.5" floppy disc drive. It has a qwerty keyboard and a 40+2, 8 dot braille cell display and also features a 40-character LCD display to show the text being displayed on the braille line. The Braillex Compact can be used as a standard PC and can be connected to a VGA monitor, ink/braille printers and two PC Card slots. It will also work with Windows using the WinDots Windows access software.

Prices from £8,765 excluding VAT from Alphavision.

David

This is an advanced braille keyboard computer with a 40 + 4-cell braille line that is fully compatible with PC computers. Each braille 8 dot cell has a cursor routing facility (press it and the cursor goes automatically to that cell). The David has the option of speech

output as well as a braille display and there is a built-in grade 2 braille translation program. The David can be connected to a standard computer monitor and a qwerty keyboard can also be plugged into it, if required – all very flexible. Text can be printed out in braille or print and the David can act as a braille terminal (display) for most PC computers. This is a very sophisticated machine which is reflected in its price. *Prices* £8,500 excluding VAT from Sensory Systems.

Eureka A4

This is a well-established Australian-made braille keyboard computer with speech output. It is slightly larger and more expensive when compared with some of its direct rivals, the Pioneer and Braille'n Speak. It does, however, offer more features including an in-built disc drive as standard. The Eureka has very quiet rubber keys and slider controls to control the pitch and volume of the speech. Its numerous features include: word processor, headphone socket, note taker, database, diary, thermometer, music composer, scientific calculator, alarm clock and calendar, telephone modem, optional qwerty keyboard input, voltmeter, telephone directory and communication terminal.

Files written using the word processor or note taker options can be printed out in braille or print. The ink printer used should have a serial interface – a serial to parallel adapter cable will be needed if you want to use a parallel printer. Extra options can be bought for the Eureka. These include: a PC screen reader, advanced user option, advanced communications, advanced music option, colour sensor, multimeter and hand-held scanner. The Eureka does

not have an on-board text to braille translation program which is standard in the Pioneer and Braille'n Speak. Text to braille translation is provided by the Braillemaster software, packaged free with the Eureka. The Eureka Professional add-on now incorporates the Oxford dictionary and thesaurus. *Prices* from £1,815 (A4 advanced) to £2,340 (professional) excluding VAT from Techno-Vision Systems.

Mountbatten

This brailier is the result of research and development aided by a memorial trust fund set up after the death of Lord Louis Mountbatten. It works like the Perkins mechanical brailier, the user presses the braille keys and braille is embossed on to braille paper inserted into the machine. The keys however are 'power driven' and much less physical effort is required than on the Perkins – sometimes an important consideration for particular pupils. The Mountbatten has proved noisy to use and can be distracting in the classroom situation. However, the machine has a 'silent mode' and braille can be entered with no noisy printing off taking place – embossing is done later. Single sheets of braille can be produced on many sorts of paper and card. This is a flexible feature that most braille embossers do not have. The Mountbatten can be used as an embosser for other devices, but is very slow. It is not a word processor so only limited correction of mistakes can be made. A print copy of the braille text can be produced on a normal ink printer with the advanced model. The machine is battery or mains powered and is about the same weight as the Perkins mechanical brailier. *Prices* £1,395 to £1,730 excluding VAT from RNC Enterprises.

Notabril

This is a very small note taker with a 20-cell braille display. It is one of the smallest devices available with a braille line output. It is meant for writing notes rather than essays and does not have a back translator. This means that if a print copy of a piece of work is required, then the text needs to be entered in grade 1 braille – it will not translate braille contractions into print (except through another computer using a back translation program).

Price £4,565 excluding VAT from Vis-Ability.

Pioneer

The Pioneer is a British portable note taker with full word processing facilities including a spelling checker. Text can be printed out in both braille and print (there is an internal braille translation system). It also features a diary, clock, calendar, personal telephone directory, a user defined abbreviations table, form filling program and a scientific calculator. Optional extras include an MS-DOS compatible disc drive, foreign language support, Stainsby keyboard and single-handed keyboard options. *Price* £595 excluding VAT from Pathway Communications.



Qwerty keyboard note takers

This section deals with note takers which have qwerty keyboards rather than the more common braille keyboard. These devices might suit a person whose touch typing is fast but whose braille speed is slow.

INKA

The Baum INKA (integrated keyboard access) incorporates a conventional qwerty keyboard and a 40-cell 8 dot display. There are options for an additional 12 braille cells or a speech module with a choice of three languages. The display has horizontal and vertical sensors for cursor routing. *Prices from £7,200 excluding VAT from Sensory Systems.*

Type 'n Speak

This note taker does not have a braille keyboard at all and is included here only because it is a note taker. It is constructed around a qwerty keyboard and provides a word processor with spell checker, calendar, calculator and clock. Information can be saved in memory or on a floppy disc and the Type 'n Speak connects to a wide range of embossers and printers. The device is portable – weighing under one kilogram and having a battery life of 12 hours. *Price £1,295 excluding VAT from Sensory Systems.*

Braille input via qwerty keyboard

There are software programs which allow 6 keys of the qwerty keyboard to be designated as braille keys. By this means, a brailist can braille directly with a qwerty keyboard. This can be very useful for doing advanced or unusual braille, such as Welsh or advanced maths braille. There are several of these

programs, for example the Navigator braille display has one as part of its package. So does MegaDots from Alphavision.

Printing braille

Much braille is created manually by the ubiquitous Perkins brailier. Braille stored in electronic form, however, is produced using an embosser (a braille printer). This section deals with the resources available for printing braille.

Braille labels

3M/Scotch braille labeller

Braille labels are used widely in schools. This machine can make braille labelling a snip. It is the well-known braille labeller with a braille symbol 'head'. Because of space restrictions on the printing head, it embosses in grade 1 braille and a reduced set of grade 2 symbols.

Price £38 including VAT (concessionary price £32 excluding VAT) from RNIB and Techno-Vision Systems.

Braille embossers

Braille embossers are braille printers which produce standard tactile braille on paper or thin card. They are the braille equivalent of ink printers. They braille information generated by computers and note takers. Braille embossers differ from one another in the speed of embossing (measured in characters per second), graphics capability, weight, size, sideways embossing capability, price, interface (serial or parallel), noise levels and dot quality. Be aware that performance data, for example speed of printing, may vary under certain operating conditions.

Braille embossers					
Embosser	No. of dots	Speed (cps)	Weight (kg)	Size (cm)	Price
Braille Blazer	6/8	10 to 15	5.4	38x25x15	£1,095
Braillo Comet	6/8	40/100	14.0	38x25x15	£2,795
Index Basic-S	6/8	78	8.0	52x24x12	£1,495
Index Basic-D	6/8	78	8.0	52x24x12	£2,250
Index Everest	6/8	100	11.0	56x43x17	£2,595
Porta Thiel	6/8	10 to 15	4.5	39x25x11	£995
Versapoint	6/8	40	14.0	78x68x36	£2,660

Braille paper

Most embossers use continuous paper but a few allow the use of single sheet paper, thin card and plastic sheet. All suppliers of braille embossers should be able to supply the braille paper as well. This is usually the tractor-fed continuous type. RNIB do five types of computer braille paper sold in boxes of 500 sheets. Prices vary according to size and there is a concessionary price for visually impaired people.

Prices £10-£16 including VAT per box of 500 sheets (£8-£9 concessionary price) from RNIB and most suppliers.

Braille Blazer

This small, low-cost embosser weighing around 6kg has a 'talking menu' so that a blind person can control and select various parameters. Other features include: both serial and parallel interfaces and the use of 22cm x 28cm braille paper. *Price* £1,095 excluding VAT from Sensory Systems.

Braillo Comet

Braillo embossers are made in Norway and are well established in the UK. Features include: user changeable braille codes, 6 or 8 dot braille, adjustable printing pressure, tractor

feed paper only, serial interface only.
Price £2,795 excluding VAT from
Sensory Systems.

Index Basic Range

This popular range has been replaced with two new models: the Basic-S and the Basic-D. The S model embosses on a single side of the page and the D model does double sided work. Both models have a speech menu and can use cheap paper for brailleing. Some suppliers sell an embosser as a complete system with braille paper, cables, print and braille manuals and braille translation software. *Prices* £1,495 (model S) to £2,250 (model D) excluding VAT from Alphavision, Dolphin Systems, Pathway Communications, Pia, Professional Vision Services, Sensory Systems, Techno-Vision Systems. Sight and Sound Technology offers a 20% discount on all Index braille embossers.

Index Everest

This embosser is one of the few that print double sided braille. It has a speed of up to 100 cps and has speech-driven menus allowing easy set up by a blind person. Other features include: user-definable braille codes; 6 or 8 dot braille; adjustable dot impact; relatively

low noise level, serial and parallel interfaces, integral single sheet feeder (capacity 100-150 sheets depending on thickness), and multicopy facility up to 999 copies.

Price £2,595 excluding VAT from the same suppliers as for the Index Basic range, except Dolphin Systems.

Porta Thiel

The Porta Thiel is, by a small margin, the smallest and cheapest embosser currently on the market. Features include: single sheet or continuous paper embossing facility, adjustable impact strength, 6 or 8 dot braille, external keyboards can be connected and maximum paper size is 28cm x 33cm. A double-sided interpoint model is also available.

Prices from £995 (single-sided) and £1,595 (double-sided) excluding VAT from Techno-Vision Systems.

Versapoint 40

This very versatile embosser has a printing speed of 40 cps. Features include: graphics facility, true sideways printing, serial/parallel interfaces, 6 or 8 dot braille, underlining facility, tractor-fed paper, excellent dot structure, adjustable impact strength, multicopy up to 99 copies and braille arithmetic formatter.

Price £2,660 excluding VAT from Sensory Systems.

Translation software for braille

Nearly all qwerty keyboard computers (and the Eureka) need braille translation software in order to produce full grade 2 braille on an embosser. Text written on a word processor is translated inside the computer to grade 2 braille using the

braille translation program. The translated text can then be printed off in braille using an embosser or alternatively may be displayed on a soft braille line.

The manuals for braille translation software are notoriously difficult to follow, and you may need to obtain training in the use of translation software. Most text to braille programs can be used by non-sighted users with appropriate equipment. Much of the translation software is written for PC computers, but programs also exist for BBC, Archimedes, Apple Macintosh and Nimbus PC-186 computers. Braille translation packages work with most word processors. Sometimes the braille translation program can handle a word processor file directly. In many cases it cannot. In the latter instance writing has to be saved in ASCII format, that is text without any formatting codes such as indent, bold or italics and so on. An ASCII file contains only the text of your document. Most word processors allow you to save your work in this format.

Braille translation is extremely useful in schools. Once mastered, it allows a teacher to produce braille quickly using a computer. However, for the reasons mentioned above, be aware that the creation of perfect braille takes training.

Braille Maker Transcript – (PC)

This program produces large print and braille. There are automated procedures to print direct from WordPerfect, Word for Windows and WordStar files.

Price £175 excluding VAT from Pia.

Braille Maker Express – (PC)

This braille translation program for PC computers includes the following features: automatic formatting, page numbering, useable by non-sighted people, hotline

Braille translation software		
Translation program	Computer	Price
Braille Maker Transcript	IBM compatibles	£175
Braille Maker Express	IBM compatibles	£95
Braille Maker Professional	IBM compatibles	£495
Braille Maker Network	IBM compatibles	from £595
BrailleMaster 6.0	IBM compatibles	£285
BrailleMaster	Eureka A4	£130
Cipher	IBM compatibles	£175
Duxbury Braille Translation	IBM compatibles	£450
Duxbury Braille Translation	Apple Macintosh	£338
CENTRE text to braille	BBC B/Master 128	£17
CENTRE text to braille	IBM compatibles	£17
MegaDots	IBM compatibles	£375

telephone support, large dictionary and unlimited file size. It delivers grade 2 braille from WordPerfect, Word for Windows and WordStar files without any special preparation.

Price £95 excluding VAT from Concept Systems, Pathway Communications, Pia and Sight and Sound Technology.

Braille Maker Professional – (PC)

This has all the features of Braillemaker Express plus other features including: braille to text facility, large print ability, mathematics capability and foreign languages output.

Price £495 excluding VAT from Concept Systems, Pathway Communications, Pia and Sight and Sound Technology.

BrailleMaster – (PC)

Version 6.0 is a major new version of this popular translation program. The package includes both DOS and Windows versions. Features of this

translation package include a file editing facility and an ability to be used by a non-sighted person. The PC version now has a WYSIWYG (what-you-see-is-what-you-get) preview of the braille page, plus foreign language capability and ink print braille for sighted proof readers.

Prices from £285 (PC) excluding VAT from Techno-Vision Systems.

Cipher Braille Translator – (PC)

This popular braille translation package has now been updated and contains several new features. Cipher can now take files in selected word processor formats and include the formatting from the print document in the braille output. It also allows users to define style templates which can then be used to produce different types of braille document. In addition, Cipher also allows braille pages to be viewed on screen before printing.

Price £175 excluding VAT from Dolphin Systems.

Duxbury Braille Translator – (PC & Apple)

This sophisticated braille translation package has many advanced features and is available for both PC and Apple Macintosh computer systems. Using a standard 14" computer screen it is possible to produce graphically very accurate and user-definable braille dots, which can then be printed out on an ink printer. These printed dots are particularly useful for labelling masters for tactile diagrams using the swell-paper method. See this page for more information about tactile diagrams. Duxbury is the only commercial braille program for the Apple Macintosh.

Price £450 excluding VAT from Sensory Systems, £338 excluding VAT from Don Johnston Special Needs.

CENTRE Text to Braille – (BBC & PC)

This long established program is available for both BBC and PC computers. With the BBC, it is designed to work with either Wordwise or View word processor systems. With PCs, WordPerfect and Word for Windows are popular word processing packages for this software.

Price £17 excluding VAT from Research Centre for the Education of the Visually Handicapped (RCEVH).

MegaDots – (PC)

Comprehensive translation program cum word processor which supports WYSIWYG display. You get to see braille dots on the screen and can edit the braille manually once it is translated.

Prices from £375 excluding VAT from Alphavision and Pia.

Tactile diagrams

Tactile diagrams are usually a vital part of the curriculum but making them can often be difficult and time-consuming. There are quite a few ways of constructing tactile diagrams but two of the most frequently used methods are 'swell-paper systems' and 'vacuum-forming'. RNIB produces and sells publications on producing tactile diagrams by these and other methods – contact RNIB Book Sales Service, at RNIB Education Centre: London or RNIB Customer Services in Peterborough for details.

The HotSpot Fuser, Tactile Image Enhancer and Thermo Pen detailed below all require special paper, commonly referred to as 'swell paper'. Diagrams can be photocopied on to this paper and then processed to produce a tactile diagram.

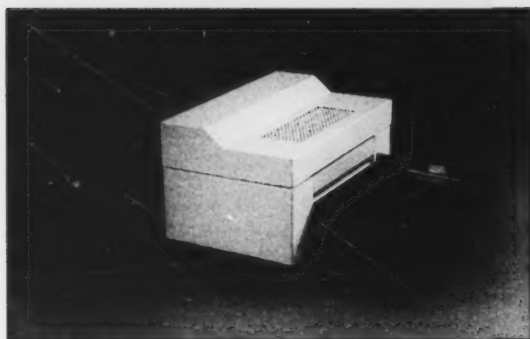
Braille Reproduction 350

This vacuum forming machine forms an image of a 'master diagram' on plastic sheets. Although it is designed for braille reproduction, it also makes good tactile diagrams. The diagrams can have multi-levelled relief which is often desirable for example when producing geography resources.

Price £2,355 excluding VAT from CR Clarke.

HotSpot Fuser

This is a new design and currently the only swell-paper tactile diagram machine on the UK market. The raised diagrams (and braille text) are produced in black, and since the background paper colour is light, this gives good contrast which might help a person with some residual vision. The relief is one level only. A big



advantage of swell-paper diagrams is that they can be made relatively quickly.

Price £895 excluding VAT & delivery from Visualeyes.

Picture Braille

This software package sends the screen image to an embosser to produce a tactile diagram. It is possible also to add braille and moon labels.

Price £200 excluding VAT from Queen Alexandra College.

Tactile Image Enhancer (TIE)

This swell-paper fuser works in an identical way to the HotSpot Fuser. It provides a quick and simple way of producing an instant tactile image on swell-paper and is capable of taking A3 swell-paper.

Price £750 excluding VAT from Queen Alexandra College.

Thermo Pen

This inkless pen produces raised drawings on swell-paper. This is an instant process which makes tactile drawings.

Price £100 excluding VAT from Queen Alexandra College.

Swell-paper

This paper is necessary to produce tactile diagrams with the HotSpot Fuser, Tactile Image Enhancer and Thermo Pen. Two types of swell-paper are available:

Flexi-Paper

This is a fabric based swell-paper which is virtually indestructible. It is available in both A4 and A3 sizes.

Prices from 60p/sheet (A4) £1.20/sheet (A3), prices vary with quantity ordered from Queen Alexandra College.

Micropearl Minolta

Minolta Paper is available in A4 and B4 sizes and is available in boxes of 200 sheets.

Prices £123.38 (A4) and £151.28 (B4) Minolta swell-paper from RNIB.



Chapter five

Speech systems

John Lodge



Introduction

Visually impaired learners depend more upon their sense of hearing to communicate with the world than do their sighted peers. Technology can be used to exploit the usefulness of the auditory channel in a variety of ways: by means of recorded sound, usually on cassette; synthetic speech using a synthesiser; sound cues in a piece of software; and increasingly, through the use of voice recognition systems.

The most common and cheapest speech devices are cassette recorders. Any cassette recorder can be put to good use, but details are given later in this chapter of models which have extra features that are especially useful for a visually impaired user. Speech synthesisers

speak text that is fed to them, often by a computer. The 'voice' of a synthesiser sounds rather 'robotic' but users get used to it and can find a synthesiser very helpful in accessing information.

Synthesisers need to work with individual application programs; it is important, therefore, when buying a speech synthesiser to check that it will actually work with the software you are using. Synthesisers function best in the MS-DOS operating system. They have more difficulty coping with the newer graphical user interface operating systems like Windows. Since the business world has moved largely towards graphical user interfaces, this situation represents a serious challenge to blind users. Fortunately, there have been some technical developments in obtaining speech from Windows.

Warning

You must be sure to check with the suppliers of any of these products if you wish to use them with Windows 95. Due to the substantial differences between the ways in which Windows 95 and previous versions of Windows operate, some Windows-based products may not work correctly. Please verify this with your supplier before purchasing software.



Text scanning technology has developed and improved over the last few years. A computer can scan a sheet of text and, after a few seconds' processing, can read the text aloud in synthetic speech. This method provides access to all kinds of information, and although it has its limitations, is proving a boon to many users.

Voice input systems allow the user to enter information into a computer directly from the human voice. They recognise a limited range of spoken commands and are beginning to find applications for blind users.

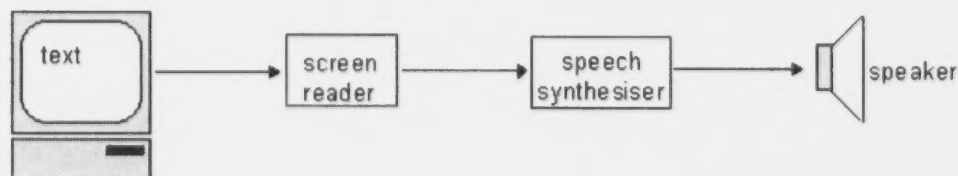
Speech systems

This section deals with speech systems which can be connected to a computer. A speech system has three parts: a screen reading program, a speech synthesiser and a loudspeaker (or

Screen readers and synthesisers are dealt with separately in the sections below. However, it is worth noting that if a screen reader and synthesiser are purchased together – as a package – then it is likely that they will integrate well together and that the package will cost you less than buying the separate parts.

Screen readers

A screen reading program sends instructions about screen contents to the synthesiser. The screen reader can be set up to read the whole screen, user-defined areas, a line, a word or an individual letter. Options for speaking capital letters, punctuation and symbols are available. Screen readers often support more than one make of synthesisers, so shop around to get a combination of screen reader and synthesiser that suits your needs.



Elements of a speech system

headphones). The screen reader 'reads' the information on the computer screen and passes it to the synthesiser. The synthesiser processes this information and turns it into speech which can be heard through a speaker or headphone. These steps are represented in the illustration above.

At the time of writing, Windows 95 has been available for around six months. Many of the screen reading packages for Windows 3.1 will not work well (if at all) with Windows 95. Screen reading packages designed to work with this system are gradually being released and upgrades are generally available for

If you need access to Windows or DOS,
Take a byte of technology that's easy to swallow.

JAWS

FOR WINDOWS

JAWS for Windows (JFW) offers all the features that made JAWS for DOS so popular, plus many more. Powerful yet easy to use, JAWS for Windows incorporates such features as: Smart Screen Technology; the helpful Wizards; a Bitmap Recogniser; logical, easy to use speech pad; multiple synthesiser support; the powerful, new JAWS Macro Application Language (JAMAL); and total flexibility.

Easy to use Menus * Built-in Pop-up Helpers * Adjusts from Beginner to Pro * Complete Synthesiser Support * CD-ROM Compatible * Cassette Training Tutorial * True Windows Application * Friendly Manual.

JAWS for Windows 95,
will be available in the coming months.

Sight & Sound Technology
Qantel House, Anglia Way, Moulton Park,
Northampton, NN3 6JA.
Telephone: (01604) 790969 Ext: 207
Fax: (01604) 790559



Screen readers		
Screen reader	Computer	Price
Artic WinVision Solo	PC	£495
HAL5	PC	£210
JAWS	PC	£399
Outspoken for Windows	PC	£375
Outspoken	Apple Macintosh	£349
Protalk 32	PC	£1,400
Talking Screen Reader	BBC B/Master 128	£17
Vocal-Eyes	PC	£350
Windots	PC	£1,795
Window-Eyes	PC	£450
Windows Bridge	PC	£295
Winvision	PC	from £450

people using packages written for the previous versions of Windows (this will depend on whose software you purchased). When purchasing a screen reader make sure you specify which version of Windows it will be used with.

Artic WinVision Solo (PC)

WinVision Solo allows access to Windows-based software via speech. It offers many features to ease the use of Windows including, automatically speaking dialogue boxes, scroll bar buttons and icons with or without text labels. The Docu-Pilot feature also allows the automatic reading of documents without the need to turn each page. A version is available for Windows 95 called WinVision 95, this offers the same capabilities as WinVision Solo. WinVision Solo works with a range of speech synthesisers including

DECTalk, Juno and Apollo 2.

Price £495 (WinVision Solo), £595 (WinVision 95) both excluding VAT from Concept Systems.

HAL5 – (PC)

HAL5 takes the information on your computer's screen and tailors it for speech output through a speech synthesiser. It can monitor set areas of the screen and undertake actions in response to pre-defined changes. HAL5 is supplied with a selection of in-built 'atlas' files allowing it to work with many software packages straight from the box. These atlas files replace the old HAL4 system of using separate environment files for each software package. HAL works with all of Dolphin's products and other synthesisers, such as DECTalk.

Price £210 excluding VAT from Dolphin Systems.



JAWS – (PC)

Controlled largely by the numeric keypad, JAWS also has pop-up menus to determine features like speech rate and the characteristics of the voice. It allows the user to define areas of the screen, provides a dictionary for user-defined pronunciations and can be set to read automatically any changes on the screen. JAWS works with several synthesisers including DECtalk.

Price £399 excluding VAT from Sight and Sound Technology.

Outspoken – (Apple) and Outspoken for Windows – (PC)

Used with a mouse, Outspoken will speak words and graphics beneath the cursor and will echo letters or words as they are typed. A user with little or no residual vision can move around the screen using the keyboard instead of the mouse. Outspoken also has an in-built dictionary which allows users to alter the pronunciation of words. Outspoken is the only speech program for the Apple Mac that gives full access to the system. *Price* £349 (Apple) from Don Johnston, £375 (PC) excluding VAT from Alphavision and Choice Technology.



Protalk 32

This is a Windows-only screen reader which will drive sound cards (such as the SoundBlaster), as well as Apollo and many other synthesisers. Protalk 32 also features the ability to present the menus and dialogues in a simple text-based menu structure making Windows easier to navigate using speech.

Price £1,400 excluding VAT from Professional Vision Services.

Talking Screen Reader – (BBC)

This is very similar to the RCEVH Talking Wordwise (see p30) and allows a blind user to access text on the screen through speech. It can make the word processor, View, talk to the user.

Price £17 excluding VAT from RCEVH.

Vocal-Eyes – (PC)

Vocal-Eyes is screen reading software which enables the user to control very subtly the speech environment. It comes with a wide range of environment files for off-the-shelf software and new environment files can be written for individual software packages. Vocal-Eyes

is very fast and responsive while taking up a small amount of memory. It supports several synthesisers including the Apollo.

Price £350 excluding VAT from Alphavision, Riverside Training and Foundation for Communication for the Disabled.

Window-Eyes

Window-Eyes is the Windows counterpart to the Vocal-Eyes DOS-based screen reader. It gives access to Windows software



Speech synthesisers		
Package	Computer	Price
Apollo 2	PC	£415
Artic Transport	PC	£695
Covox	PC	£70
DECtalk	PC	from £650
PC 2	PC	£310
Juno-sp	PC	£450

Vocal-Eyes in order to make the transition to Windows less fraught for those users familiar with Vocal-Eyes. Vocal-Eyes also supports a wide range of speech synthesisers.

Price £450 excluding VAT from Alphavision.

Windows Bridge

This was one of the first Windows screen readers and works with both DOS and Windows 3.x. The program will support a range of speech synthesisers including Apollo and Dectalk. Tieman, Navigator and Alva braille displays are now supported by this product giving braille access in addition to speech. Note that support for this product is via a special telephone number on a pay as you call charging scheme in order to keep the cost of the software to a minimum.

Price £295 excluding VAT from Techno-Vision Systems.

Windots - (PC)

This system works with the Braillex-2D braille display to convey screen information in addition to layout details. If one window is next to another, or a menu has been displayed so as to obscure part of a document it can pass this information to the user. Currently only braille output is provided. A very fast PC

with lots of memory is required, although the speed of the system will depend on the programs with which it is used.

Price £1,795 excluding VAT from Alphavision.

WinVision - (PC)

This works with MS Windows and MS-DOS. The DECtalk synthesiser, and others, are supported. Winvision is undergoing continued development so check its current capabilities with the supplier before you buy.

Price £450 excluding VAT from Concept Systems.

Speech Synthesisers

A speech synthesiser produces speech from text sent to it by a screen reader program. The synthesiser can take three forms: a box which is external to the computer, an expansion card which is inserted into the computer or a piece of software with no hardware at all. An external synthesiser usually connects to the back of the computer; it often has a built-in speaker for the speech and a socket for headphones. A synthesiser in the form of a card plugs into an expansion slot in the computer; a socket is provided on the card 'face' for speaker or headphones. Software which



acts as a synthesiser, outputs speech through the sound system of the computer itself.

Apollo 2 & PC 2 card – (PC)

This is probably the most popular speech synthesiser in the UK because of its low price and its large range of features. On a PC compatible, it is usually necessary to purchase HAL5 screen reading software to go with it. The synthesiser is supplied in two versions – a plug-in card called the PC 2 and an external box called the Apollo 2; the box is the commonest form.

Prices £415 excluding VAT for the Apollo 2 and £310 excluding VAT for the PC 2 card, all from Dolphin Systems.

Artic Transport – (PC)

This is a small portable speech synthesiser. It connects to the computer using a serial or parallel port and is well suited for use with a laptop computer.

Artic also supplies a screen reading program to work with the Transport. In addition, they supply a separate speech system for a desktop computer.

Price £695 (no screen reader) from Concept Systems.

Covox – (PC)

The Covox synthesiser plugs straight into the parallel socket of the PC and looks like a speaker. Covox is bundled with a simple word processor called Smoothtalker. The word processor is limited though and with all the speech facilities turned on, the speech cannot keep pace with a fast typist. However, with some of the speech facilities turned off, Smoothtalker functions well enough for use with younger children and some children with learning difficulties.

Price £70 excluding VAT from Tandy Education Supplies.

DECtalk PC – (PC)

Some users prefer the sound of DECtalk speech which has an American accent to Apollo speech. DECtalk has recently become available as a plug-in card and its price has also been drastically reduced. Like the Dolphin products, it does need extra software to make it work properly. Suppliers will often bundle it with a screen reader. DECtalk has a large range of speech facilities including the 'famous' collection of nine different voices. Check out the implementation of DECtalk on the new Soundblaster AWE32 card. Some systems are using this for speech in a limited way with Windows (see Keystone). DECtalk is available in an internal PC card or as an external version called DECtalk Express.

Prices from £650 excluding VAT from Alphavision, Concept Systems, Professional Vision Services, Sight and Sound Technology and Techno-Vision Systems.

Juno-sp – (PC)

This Dolphin synthesiser can be battery or mains powered, facilitating portability when necessary. It can be fitted with one, two or four languages. The Juno has good power management, automatically turning on and off in tandem with the computer.

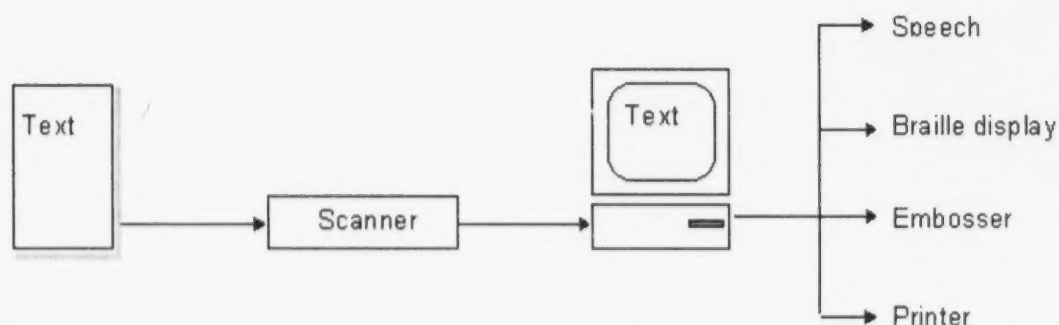
It has an in-built speaker and can connect to most PC laptop computers through the serial port.

Price £450 excluding VAT from Dolphin Systems.

Complete speech systems

Many suppliers bundle a screen reader and synthesiser together as a package to make a complete speech system. Others go further and integrate a speech system with a laptop computer. Some examples follow.

65



A PC-based scanner system

Keynote Companion – (PC)

This palmtop computer has its own built-in suite of software and speech facilities. The software includes a word processor, spell checker, calculator, diary, address list manager and a terminal program for communications. *Price* £1,500 excluding VAT from Pulse Data International.

Mastertouch and Toshiba laptop – (PC)

This speech system has some clever screen monitoring facilities which go some way towards helping a blind user to become familiar with a new application package. It can also be used with a touch tablet which allows a blind user to explore a screen by touch. Mastertouch is available as a standard PC card or as a PCMCIA card for inserting into a laptop computer. Sensory Systems sell a version of Mastertouch which fits into a Toshiba laptop. The company will fit this into a customer's Toshiba, if possible, and it recommends one day's training. *Price* £1,395 excluding VAT (plus the cost of a Toshiba Laptop computer) from Sensory Systems.

Talking word processors

Some speech facilities are created by software only and do not require the user to purchase a screen reader and synthesiser; rather the sound features of the computer itself are used to produce speech. An educational application of this technique is the 'talking' word processor, that is a word processor with speech. Several publishers market these 'talking' word processors which can be useful tools in class. For example Claris Works, First Word, Full Phases (SEMERC), Talking Pendown (Longman-Logotron), Big Mac (CENMAC) and TalkWrite (RESOURCE).

Scanners

A scanner allows print on paper to be entered into a computer without the need for typing it by hand. A sheet of text is laid face down on the glass plate of the scanner and the computer takes a picture of it. Software called an OCR program (optical character recognition) interprets the text from the picture and places it into the computer's memory.

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THE READING EDGE features nine different reading voices. It also offers a choice of reading speeds from 40 words to 550 words a minute. It will repeat words and sentences at the push of a button.

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Fax: (01604) 790559



PC scanner systems	
System	Price
Easy Reader	£425
Flat-bed scanners and Recognita	£625 to £1,225
Oscar	£1,595

Once in the computer memory, the text can be manipulated in a word processor or other applications. For example it can be read aloud through a speech synthesiser system; displayed on a soft braille line; or embossed in braille or printed on paper.

Access to information

Scanning systems have educational value for pupils. They provide independent access to texts for blind pupils. Children can take a book to the scanner and have it read out to them by the machine, page by page. Most scanners are quite straightforward to operate and are well within the capabilities of many pupils. Scanners have benefits for teachers too. Since scanned text is stored electronically, teachers can choose from several forms of output. In particular they can choose to send the text to a braille embosser. Scanners provide one route to the fast production of braille when the text in question has a simple format – a useful feature for the preparation of educational resources for pupils.

If you think that scanning systems seem too good to be true, you would be right. Scanners are not yet perfect in their recognition of text. The biggest source of difficulty is the design of school text books which are full of pictures, diagrams and visually variable text; all

very confusing to these reading machines. Scanners work best with straight text, such as in novels. Simple photographs and diagrams are no problem, however – the scanner just ignores these. Text in columns can also be coped with.

Scanning systems can be classified into two different kinds: those constructed around a standard PC system and those built as a single stand-alone system. PC scanner systems are an economic purchase if the user has a PC, since only the scanner and OCR software are needed. Stand-alone scanners are useful when a dedicated system is required; for example, in a library.

PC scanner systems

Scanners in this section describe an IBM compatible system. A PC scanning system requires three elements: a PC, a scanner and OCR software to 'interpret' the text. Optional output, includes facilities for speech and a braille display.

Easy Reader

A low-cost hand scanner complete with special software that works with most PC systems and braille lines.

Price £425 excluding VAT from Foundation for Communication for the Disabled.

Oscar

This system is software based and has a menu system to guide the user. It works with PC computers and comes with a flat-bed scanner.

Price £1,595 excluding VAT from Sensory Systems.

Recognita

Recognita OCR software packaged with



a flatbed scanner. Various configurations are available.

Prices from £625 to £1,225 excluding VAT from Alphavision, Aptech, Concept Systems, Foundation for Communication for the Disabled and Professional Vision Services.

Apple scanner systems

All Apple scanners are now sold as colour scanners, but a black and white option can be selected to speed up text scanning.

Microtech Scanmaker 2

This features Omnipage Direct (OCR software).

Price £289 excluding VAT from Apple suppliers.

Stand-alone scanning systems

The Reading Edge

The Reading Edge uses Xerox Imaging System's exclusive bookedge scanner which can handle books and other bound material without distortion or damage to the bindings. The Reading Edge can read a large variety of printed materials including books, magazines, photocopies, faxes and documents with multiple columns. The built-in braille keypad allows users to edit the pronunciation of words. Data can be stored and retrieved on a Blazie disc drive or a personal computer and printed out in braille.

Price £3,950 excluding VAT from Sight and Sound Technology.

Stand-alone scanning systems		
System	Auto scan	Price
The Reading Edge	Yes	£3,950
Open Book	Yes	from £1,225
Robotron Rainbow	Yes	£3,030

Open Book

This system consists of: a system unit which is in fact a PC computer, a 17 key keypad, a compact automatic scanner (made by Hewlett Packard), DECtalk high quality speech and Wordscan software. Accuracy of reading text is very good even with dot matrix print. Note that the Open Book can be purchased more cheaply if you opt to use your own computer, instead of the one supplied with the complete package.

Prices from £1,225 excluding VAT from Dolphin Systems, Sensory Systems and Foundation for Communication for the Disabled.

Robotron Rainbow

This compact stand-alone scanning system has built-in speech. Data can be transferred to a PC computer and printed out in braille, if needed. The Robotron is a single unit and weighs 8.1kg. Features include: scans at 10 seconds per page; maximum document size 21cm x 35cm; recognition of point sizes from 6 to 72; automatic recognition of columns. Synthetic speech is by DECtalk.

Price £3,030 excluding VAT from Concept Systems, Techno-Vision Systems and Pulse Data International.

Cassette recorders

The cassette recorder is the most widely used speech technology. Here are some models which are especially useful for visually impaired users:

APH Handicassette

The American Printing House (APH) for the blind produces a small portable tape recorder with a wide range of special features added to assist blind users. These



include tactile markings on operating buttons, an in-built pulsing facility to mark and quickly find sections on a tape, and an in-built microphone. The machine uses four tracks for recording and has a half speed facility. This effectively doubles the recording time of a standard cassette, so an ordinary C90 tape can record up to three hours of speech. The Handicassette has variable speed/pitch control which means that the tape can be played back at up to twice the speed it was recorded at, without sounding like Donald Duck.
Price £156 excluding VAT from Hagger Electronics.

APH Desktop Model

This is a larger version of the Handicassette with all the same facilities except variable pitch. The quality of sound is better than on the Handicassette and all the operating buttons are larger which may make it easier to use with younger children.
Price £238 excluding VAT from Hagger Electronics.

Easiplay Cassette Player

This is a two track cassette player (no recording facility) with high contrast yellow buttons featuring tactile markings; it is suitable for users with reduced dexterity.

Price £49 excluding VAT from Clarke and Smith Manufacturing.

Easiplay Radio Cassette Recorder

This system has large, well spaced, high contrast controls with tactile markings to make it easier to use for people with visual and/or physical difficulties. It features a two track tape recorder and an FM/MW/LW radio with five pre-set stations for each waveband.

Price £95 excluding VAT from Clarke and Smith Manufacturing.

Marantz CP130

This cassette recorder can apply local and remote tone indexing. It has two speeds of recording: normal and slow. The slow speed allows 3 hours on a C90 tape or 1.5 hours of continuous recording on one side.

Price £269 excluding VAT from Hagger Electronics.

Miscellaneous speech devices

RNIB Electronic Newspaper

This system allows the *Guardian* newspaper to be downloaded to a personal computer overnight. Cost includes upgrade for PC, installation, training and a year's subscription.

Price £835 excluding VAT from RNIB.

Colour tester

This hand-held unit reads out the colour of the surface when it is placed on an object.

Price £595 excluding VAT from Vis-Ability.

Columbus talking compass

Speaks the four main cardinal points, N, S, E and W; as well as the four inter-cardinal points. Available in many languages; two languages come with each compass.

Price £60 from Techno-Vision Systems.

Galaxy 40 Speech scientific calculator

This is a scientific calculator with speech. It has a built-in loudspeaker and headphones may also be used.

Price £450 excluding VAT from Pulse Data International.



Portset teletext reader

This system gives a user speech or braille access to Teletext services such as Ceefax and Teletext as well as to satellite and cable TV teletext services (where the user has such facilities).

There are two versions of the reader: a stand-alone talking unit and a card that fits inside a PC computer. Any of the stand-alone models can have a serial or parallel port added for £110 (plus VAT) to allow information to be downloaded to a computer for storage or later printing or embossing. The stand-alone unit also provides an option to access the audio channels of TV broadcasts and does not require a TV licence.

Prices £188 excluding VAT (for card) and £599 excluding VAT (for stand-alone unit) or £649 (stand-alone unit with TV sound) from Portset.

Teletext adaptor for Eureka or PC

This is an external device which connects to the RS232 port on a PC or Eureka. It gives access to text sections of Teletext.

Prices £295 excluding VAT (Eureka and PC External) and £195 (PC) from Techno-Vision Systems.

Teletext News Service System (PC)

This PC expansion card can be fitted to a desktop PC to provide an up to the minute news and information service by accessing the BBC/ITV teletext pages.

Price £175 excluding VAT from Dolphin Systems.

Tandy talking calculator

Tandy sell a talking calculator with in-built speech and a large display which makes it suitable for blind and partially sighted users. Do check that you are getting a version with a headphone socket if you want to use it in the classroom.

Price £14.50 excluding VAT from Tandy Educational Supplies.

Tandy talking multimeter

This Voice Meter should prove to be useful in secondary science lessons. It is auto-ranging and measures 1000 VDC, 750 VAC, 300 mA AC/DC and 30 megohms resistance.

Price £68 excluding VAT from Tandy Educational Supplies.

Language Master

This hand-held device with a qwerty keyboard and speech combines a spelling checker, dictionary, thesaurus, grammar guide and 10 educational games.

Price £255 excluding VAT from Pathway Communications, Techno-Vision Systems, Vis-Ability and Pulse Data International.

Speech input systems

Speech input systems provide an alternative means of entering text into a computer. Instead of typing at a qwerty keyboard, the user speaks into a microphone. The computer recognises the words spoken and they are stored in memory. Speech input systems have great potential for many disabled users, and are improving rapidly in terms of reliability and affordability.

The computer is taught to recognise an individual's vocabulary through a (usually) lengthy process of dictation; although extra words can be obtained through vocabularies purchased from suppliers. Be aware, however, that you will need a high specification computer to operate these voice input systems. Most systems also work in the Windows environment and have more than one window open at any time. This can make



it difficult for a visually impaired person to operate the system.

DragonDictate – (PC)

DragonDictate (for DOS or Windows) turns the computer into a voice-driven workstation. Users can enter text by speaking into a microphone. Spoken information is converted into electrical signals and coded by a special circuit board so that it can then be understood by the program. DragonDictate runs in the background of the computer so you can run your application programs in either DOS or Windows as usual. Vocabularies from 5,000-60,000 words can be purchased separately. Prices start at £399 excluding VAT from Aptech.

Keystone Dictation System – (PC)

This system is based on a PC system

using a SoundBlaster card to give high quality speech in conjunction with DragonDictate speech recognition which is operated through natural spoken English. The user has access to either 5,000 or 25,000 words and can define either 2,000 or 5,000 special words and commands.

Prices from £350 (Windows software only) to £995 (bundled with voice recogniser and synthesiser) from Aptech.

Keystone for Windows – (PC)

Text-to-Speech using SoundBlaster 16 Bit, or most serial port speech synthesisers. A screen reader with integrated word processor, magnification, large text and colour changing facilities. Keystone can read dialogue boxes and menu bars within most Windows applications.

Voice Navigator – (Apple)

The Voice Navigator can be used with an Apple Macintosh computer to replace the mouse actions with spoken commands. The system consists of software, a microphone and a box which connects to the computer. Time has to be spent training Voice Navigator to recognise the user's voice. This system has potential for physically disabled users who find a mouse difficult to use. Combined with Outspoken (see p60) it might help a blind user to use an Apple Macintosh computer.

Price £599 excluding VAT from Apple.

Power Secretary – (Apple)

Power Secretary can be used to enter text into your chosen Apple application by speaking into a microphone. Power Secretary has a 120,000 word vocabulary based on the Random House Dictionary and can handle multiple users (each user must train the program individually).

Price £1,475 from Aptech.



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Keystone for Windows™ offers a universal and effective solution to the problems of document production on the PC. Introducing many unique features, Keystone is particularly useful in helping people with dyslexia or visual and physical disabilities overcome the problems of working in the Windows™ environment.

Keystone offers screen reading facilities (*text to speech*), advanced document correction, OCR support, plus adjustable speech and visibility settings. Keystone may be used with the *DragonDictate™* speech recognition system for voice dictation and hands-free control over Windows™ applications.



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01661 - 860999



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Keysoft – The PC Companion



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Keysoft is available in 3 formats

- Keynote Companion – a Palmtop Computer with Keysoft
- Keysoft SN – Laptop software with Keynote Gold*
- Keysoft ST – PC software with Keynote Gold*

* Keynote Gold Speech comes either as a Stand Alone or on a PCMCIA Voicecard.

Other Speech Products include:

- Robotron Rainbow OCR,
- Galaxy 40 Scientific Calculator
- Franklin Talking Dictionary

For more details, contact Pedro Polson

Pulse Data International UK Ltd, Greensbury Farm, Bolnhurst, Bedford MK44 2ET.
Tel 01234 376771. Fax 01234 376279.

VIDE (Visually Impaired learners' Database of Educational materials)

VIDE is a bibliographic database of alternative format educational texts, primarily braille and cassette tape, suitable for visually impaired children and young



people. It is fully compatible with library records and is accessed through a purpose-built set of search tools suitable for non-computer literate people.

For details contact: RNIB Book Sales Service,
Garrow House
190 Kensal Rd, London W10 5BT
Tel. 0181-968 8600

Materials production made easy

John Lodge describes an integrated computer production system to simplify the production of braille and large print resources for visually impaired children.

The production of braille and large print learning materials by computer is now a well-established technology. However, although the benefits of such production are appreciated, in practice many teachers are not information technology experts and find themselves frustrated by technical hitches. Consequently the production of learning materials is often severely delayed.

The production process itself involves the co-ordination and management of disparate software and hardware components, for example a scanner/Optical Character Recognition program, a word processor, a braille translation program, an embosser and so on. Some of these items are far from common in a mainstream educational setting. It is hardly surprising therefore that the technical know-how and competence needed to use them often defeat those who are charged with producing resources.

There are two ways to improve this situation: give training for the intended users or make the system as easy to use

as possible. This article proposes adopting the second approach.

To make resource production easier to understand, an integrated production system has been put together, which readers can copy. Since many educators regularly and successfully use a word processor, the system has been built around the most popular Windows word processor – Word for Windows.

The production process

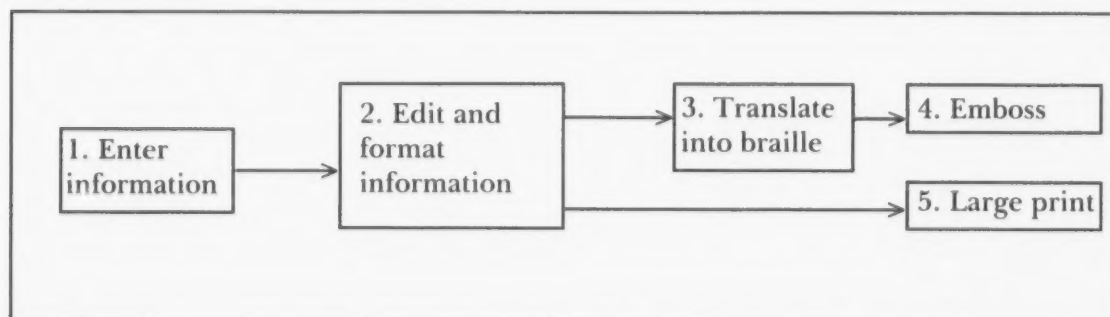
There are several steps in braille or large print production. These are described in the diagram below.

1. Enter information

Information can be entered in various ways. The system described here supports four ways: typing at the keyboard; scanning print; importing information from a CD-ROM; and downloading material from the World Wide Web (Internet).

2. Edit and format information

Once entered, information is rarely in a fit state to be brailled immediately or printed large. Spellings may need to be



checked and corrected; the font size may need to be enlarged; symbols such as bullets may need to be removed before brailleing can begin.

3. Translate into braille

To produce information in grade 2 braille, a translation program is needed.

4. Emboss

Braille is turned out on an embosser.

5. Large print

With text size and layout arranged, the information can be printed large.

Computer production system

Our production system was:

- ☐ 486 PC computer
- ☐ internal CD-ROM drive
- ☐ internal 14.4K modem with Netscape
- ☐ flatbed scanner & TextBridge OCR software
- ☐ Windows 3.1 software
- ☐ Word for Windows (Word 6) word processor
- ☐ BrailleMaster (for Windows) braille translation software
- ☐ HP LaserJet 4 laser printer
- ☐ Versabrilie embosser

The cost of the system – at the time of writing – is approximately £5,250.

Controlling the production process

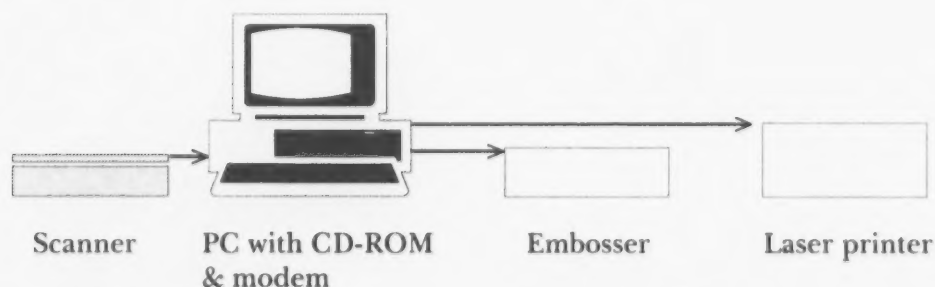
With other systems the production process can potentially be confusing because so many different components are involved. This system simplifies the process in two ways.

It works entirely through the Windows environment – thereby ensuring a good level of consistency across all the software.

Word for Windows (Word 6) can be set up to control the production process. Here's how it is done:

Word 6 allows the user to add new options to its menus. Four new options can be attached to the bottom of the File menu: *Braille Translation*, *CD-ROM*, *WWW* (World Wide Web) and *TextBridge OCR* (see illustration below).

TEMPLATES...	
PAGE SETUP...	
PRINT PREVIEW	
PRINT...	CTRL+P
BRAILLE TRANSLATION	
CDROM	
WWW	
TEXTBRIDGE OCR	
EXIT	



Selecting these options has the following results:

- ☐ *Braille Translation* launches BrailleMaster for Windows.
- ☐ *CDROM* prompts the user to put the disc in the drive and then loads it up.
- ☐ *WWW* dials up the Internet and launches Netscape, the WWW browser.
- ☐ *TextBridge OCR* prompts the user to prepare the scanner and begins the scanning process.

So, together with the standard features of the word processor, a user can now control the entire production process from Word 6.

Adding extra menu options

How are the extra menu options added to Word 6's File menu?

This is done using the *Customise* feature from the *Tools* menu in Word 6. Macros can be written and associated with each new menu option. The contents of the macros is reproduced at the end of this article. Adding new options in this way is straightforward for an advanced Word 6 user to replicate – although likely to be something of a challenge for a novice or intermediate user. If you are not expert and would like to experiment with this approach, you might like to pass this article to your local IT expert and ask that person to do it for you.

Information sources

In constructing this production system, it was felt important to allow information to be gathered from as wide a range of sources as possible.

Keyboard

The simplest and most flexible way to produce materials is by typing the information at the keyboard. This works well when small amounts of information are needed or when plenty of time is available.

Scanning

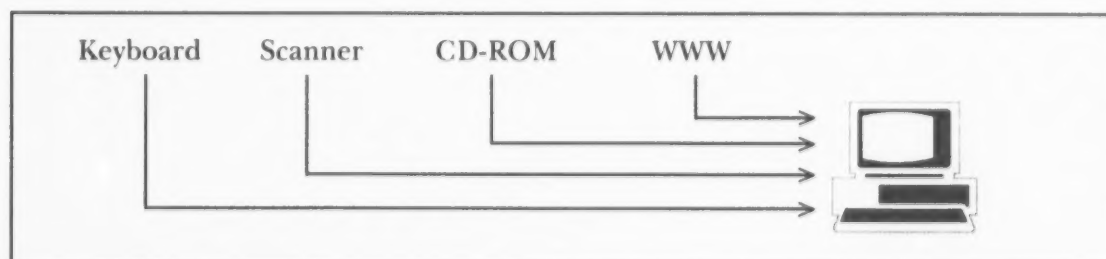
Once mastered, scanning print is an easy way of entering text into a computer. Although far from infallible, it can be a real time-saving tool and allows an educator to respond flexibly to a child's need for resources from print.

Copyright note

It is important to respect the rules of copyright. If you wish to scan or reproduce published material it is necessary to get permission first from the publisher. This is very often forthcoming in the case of preparing learning materials for visually impaired pupils.

CD-ROM

This format contains very large sources of information of real value to students. Given that many schools now have CD-ROM drives, it is becoming a



realistic option as a source of information for production purposes. Many CD-ROMs permit small amounts of information to be printed out or saved on disc. If you wish to go beyond this, then permission should be sought from the publisher.

World Wide Web

The Internet has huge reserves of information, although newcomers may need some guidance on where to find it. It is particularly good at providing the on-line texts. Much of the information on the World Wide Web is copyright-free. If in doubt, check with the publisher if permission to reproduce is needed.

Prototype

The production system described here has been in existence for about three months only, but already has received a positive response from educators. It has been used with two INSET groups of teachers of visually impaired children, who found it fairly easy to use most parts of the system. The teachers were able to draw off information from the scanner, a CD-ROM and the World Wide Web with a minimum of instruction and then, after editing, reproduce the information in braille and large print.

Alternative possibilities

Note that the system described here is intended solely for the production of

materials. With the exception of an embosser, no access technology is built into it, to enable a visually impaired person to use it. This could be added with little difficulty however. For example, Lunar for Windows would give screen enlargement and Outspoken for Windows – together with a speech synthesiser – would give (partial) access through speech.

Other computer platforms or operating systems have not yet been explored. It would seem feasible, for example, to create a similar system based on WordPerfect 5.1 for DOS, with macros (short programs) being written to launch the various software applications. There is a version of Word for Apple computers, which would make it a likely candidate also.

Postscript

The macros listed here were used for demonstration purposes only. They are by no means bomb-proof. However, please feel free to use them if they can help you. Equally, you may copy them freely and pass them on to colleagues if you wish.

It is early days yet in the evaluation of this prototype production system. Nonetheless, the author would be pleased to hear from others who are doing similar work and to assist them with advice, where possible.

John Lodge is RNIB Technology Training Officer.
You can contact him at RNIB Education Centre: London. Tel: 0181-968 8600.

Production macros for Word for Windows v6

1. Braille translation macro

```

Sub MAIN
REM Braille translation macro for use with Braillemaster software
REM Display dialogue box
Begin Dialog UserDialog 320, 92, "WARNING ..."
Text 65, 18, 183, 33, "You must save your writing in a text file before you translate.", .Text3
OKButton 117, 54, 88, 21
End Dialog
Dim dlg As UserDialog
Dialog dlg
FileClose(0)

REM Check if BM is running - if not load up
If AppIsRunning("BrailleMaster for Windows") Then
    AppActivate "BrailleMaster for Windows"
Else
    Shell "c:\bmaster\bmw.exe", 1
End If
End Sub

```

2. CD-ROM macro

```

Sub MAIN
REM Define CD-ROMs On list
On Error Goto Finish
REM Set up variable CDROM$ with 9 values
Dim CDROM$(8)
CDROM$(0) = "MS Encarta"
CDROM$(1) = "Dictionary"
CDROM$(2) = "Shakespeare"
CDROM$(3) = "Disc 4"
CDROM$(4) = "Disc 5"
CDROM$(5) = "Disc 6"
CDROM$(6) = "Disc 7"
CDROM$(7) = "Disc 8"

REM Define filenames, ie CD-ROM exe files & directories
Dim ProgName$(8)
ProgName$(0) = "C:\ENCARTA\encart94.exe"
ProgName$(1) = "C:\MACMMD\tbook.exe D:\MACMMD.TBK"
ProgName$(2) = "c:\shakes\dpsg.exe"

REM display choice box
Begin Dialog UserDialog 320, 144, "Select a CD-ROM title"
ListBox 13, 29, 160, 84, CDROM$(), .DiscNumber
OKButton 212, 43, 88, 21
CancelButton 212, 67, 88, 21
End Dialog
Dim dlg As UserDialog
Dialog dlg

```

```
REM Check which CD name was selected
If dlg.DiscNumber = 0 Then DiscName$ = "Microsoft Encarta"
If dlg.DiscNumber = 1 Then DiscName$ = "Dictionary"
If dlg.DiscNumber = 2 Then DiscName$ = "Shakespeare"
MsgBox "Place CD-ROM in the drive", 48

REM Check if CD is already active - else launch
If AppIsRunning(DiscName$) Then
    AppActivate DiscName$
Else
    Shell ProgName$(dlg.DiscNumber)
End If
Finish:
End Sub
```

3. World Wide Web macro

```
Sub MAIN
REM Launch Netscape browser
On Error Goto trap
If AppIsRunning("Winsock") Then
    AppActivate "Winsock"
Else
    Shell "C:\winsock\tcpman.exe"
End If
trap:
End Sub
```

4. TextBridge OCR macro

This menu option was created automatically when TextBridge software was installed on the computer.

Which laptop?

So you want to buy a laptop computer for a visually impaired child? But which model will you choose? Les Mason looks at the options.

The reading and writing needs of visually impaired children have prompted educators to supply them with portable computers. But how do you choose an appropriate portable computer when the marketplace is full of many different models? This article looks at some of the issues involved in selecting appropriate technology and makes some suggestions to help you in this task. Before proceeding further, you may find it helpful to read Chapter 2 which describes the different types of computers known as laptops, notebooks, sub-notebooks and palmtops.

Special cases

In addition to the portable models listed above, two other classes of computer deserve a mention here. The first kind is designed as a highly portable word processor. It resembles a flat A4-sized tablet with a keyboard and small integral LCD panel for its screen. This type of word processor has been used very successfully in schools. Although it is light, cheap and easy to carry about, the limitations of the screen display mean that it is only ever going to suit a minority of partially sighted students. Examples of this portable include the Tandy WP2/3, Amstrad NC100 and NC200.

A final class of electronic writing tool is the 'luggable word processor'. It can be useful for a small number of partially sighted pupils who can cope with its screen. This device resembles an

electronic typewriter in shape and size. It often has a reduced LCD screen which displays several lines of text, an integral floppy disc drive for saving and loading files and a built-in printer. Weighing in at around twice that of a notebook it is no lightweight. However, the size of the screen text can be enlarged to make it more visible. Examples of this type of device include the Sharp FontWriter and the Canon Starwriter.

Choosing the right notebook

Whilst visually impaired children make use of the full range of laptops described above, undoubtedly the notebook computer is far and away the most popular kind. It is also the most difficult to select since so many different models are on the market. For these reasons the rest of this article focuses on notebooks.

Microprocessor

The microprocessor chip is the brain and nerve centre of a computer. Do choose the fastest and most up-to-date one that you can afford, as generally speaking, microprocessors cannot be replaced or upgraded in a laptop. At the time of writing, the minimum microprocessor specification I would recommend is a 486 microprocessor running at 33MHz (megahertz). Faster microprocessors running at up to 100MHz are available but may exceed a limited budget.

RAM

The working memory of a computer is referred to as RAM (random access memory). To run the computer with DOS programs 4Mb (megabytes) of RAM is sufficient. However, if you wish to use MS Windows it is preferable to have a minimum of 8Mb, and 12Mb if using Windows 95. Extra RAM can usually be added later, although it is not cheap.

Hard disc

Programs and files are stored on an internal hard disc drive. Buy a drive with as much capacity as you can afford; a 210Mb hard drive would be a minimum size. Increasing the hard disc capacity in a laptop often involves the replacement of the old drive and is expensive, so beware of small hard drives.

Battery

Laptop batteries are important to a visually impaired child and the choice of battery can have important social consequences, besides impacting on the working time of the computer. An efficient battery means that a child can remain working at his/her desk. An inefficient battery has a shorter working period and may oblige the student to move to the edge of the classroom to find a socket to connect to mains electricity, taking the student away from friends and neighbours.

Most manufacturers now use battery management software to switch off the hard disc drive motor and blank out the screen to conserve power when the computer is unused for a set period of time. More sophisticated battery

technology is being introduced, but advances are slow, in comparison with other areas of laptop technology. Despite the claims, it is my experience that batteries never seem to last as long as the manufacturers state. To get three hours' use out of a laptop in one continuous session is more than satisfactory. Remember to use rechargeable batteries until they run down. Don't 'top them up' after a few minutes' use by plugging into the mains, otherwise you'll reduce their operating capacity.

Screen

Most notebook computers are now manufactured with colour screens, only a minority have monochrome screens. This trend to colour is increasing and within two to three years colour screens will be standard. Two types of colour screen are available: STN (Super Twist Nematic) and TFT (Thin Film Transistor). TFT is clearer and brighter and more expensive. Where screen clarity is essential TFT screens would be the preferred option.

In most cases, the screen should have high resolution SVGA (Super Video Graphics Array) capability. At present, colour is beyond the budget of many education purchasers. However, this situation is likely to change and colour screens will drop in price.

The size of the screen is another important consideration. For students who use enlargement software a large screen is often desirable, but be aware that some notebooks offering larger than average screens may reduce their back lighting to save on battery usage – so you lose on visibility! As ever, it's horses for courses.

Many pupils like to connect their laptop to a standard colour monitor when they're working at home. This makes it more comfortable for them to see the screen. So check that a suitable video socket is available on the proposed laptop.

Sockets

All laptops come with a range of sockets or 'ports'. You use these to connect other devices to your laptop, such as an embosser or a speech synthesiser. It's important to have all the sockets needed for all tasks. Here is a list of what may be required:

☐ a parallel socket

This connects to an embosser or printer (essential);

☐ a free serial port

This connects a speech synthesiser (If your laptop mouse uses a serial port already, then you will need two serial ports).

☐ a PCMCIA slot

This is a port on the side of the laptop into which you insert credit card-size devices such as modems, memory cards and software. See the glossary for an explanation of PCMCIA.

☐ a video socket

This enables an external monitor to be connected to the laptop.

☐ an external keyboard socket

Laptops don't have standard keyboard layouts and unusual function key combinations may be required to perform specific tasks. The ability to plug in a full-size keyboard can make life a lot easier in some situations.

Software

Many partially sighted students have excellent hand-eye co-ordination close up and will be comfortable in using a mouse to control Windows programs. Most laptops use some form of screen pointer to control the software. The pointer can be moved by means of a mouse connected to the laptop. Many notebooks come with built-in rollerballs or mini joysticks to control the pointer. Which is best is a personal preference. Do make sure, however, that you have software which enables you to adjust the design of the screen pointer to make it easily visible for the partially sighted user.

Many visually impaired students employ very specialist software and may be unable to benefit from the software 'free' with the laptop. Whilst 'free' software may be welcome, it should not be a deciding factor in selecting a laptop. Also, check that any specialist software you want to use, actually runs on your intended laptop.

Add-ons

Some laptops now have CD-ROM drives and sound cards fitted. These features add weight and use more precious battery power. However, a sound card can provide low cost (partial) access to speech for Windows and may be attractive to some users who like to support their enlarged print with speech backup.

Supplier

Select a laptop from a manufacturer with a proven record of producing good quality products that are robust and reliable. Don't forget the need for advice and after-sales support. Ring around several suppliers and compare the prices of the models you are

considering. You can find telephone numbers and prices from the many computer magazines at your local newsagent. Armed with these prices, and not forgetting to add the cost of delivery, go back to your preferred supplier and get as good a deal as you can. They may match the lower price of another supplier or offer you some 'extras' to secure a sale.

Support

Many visually impaired children depend very much on a laptop to do their written work. If the computer should break down, their writing virtually stops, with very serious consequences. The turnaround for repairs has to be very fast and reliable, so technical support is very important.

Be sure therefore to check what sort of warranty is being offered with the laptop and if it can be extended. Ask whether someone will come out to you for repairs or if you have to send the laptop back to the supplier. If it's the latter, check who pays for the courier. Consider also who

will maintain the computer when the warranty has run out.

The specialist software used by visually impaired children requires careful installation. The student – and support staff – will need training on any new programs. Be sure to budget for both software installation and training when costing out a laptop. Note that leasing is an alternative method to purchasing, which you might want to consider if you haven't the cash to purchase outright.

A new laptop should be insured for accidental damage and theft. However, insurance cover can be problematic to arrange since the child uses the machine both at school and home. While many LEAs cover laptops at school, some baulk at insurance cover out of school.

Conclusion

Finally, all other things being equal, you usually get what you pay for. If you want a reliable, robust, up-to-date, well supported, tried and tested laptop, then you have to pay the going rate.

Les Mason is an advisory teacher for IT working for Lancashire LEA. He has been using IT in the field of special needs for over ten years. His first involvement with laptops and children began in 1985 and he has been active in the field ever since.

Getting the right technology

How do you choose appropriate technology for blind children in a mainstream secondary school? Brian Perry carried out a case study.



This year my local authority was set the challenge of placing two educationally blind pupils in mainstream schools. The pupils were transferring from special schools. Until this time, we had only supported partially sighted students in a mainstream setting. One pupil was known to be leaving his special school early in the academic year and the final decision was made at Easter. This gave us one term to prepare to receive him. The second pupil decided to leave his special school about four weeks before the end of the school year and this gave us considerably less time to prepare.

The two students lived geographically too far apart from each other to be placed in the same school. We had to make quite a number of decisions to help them with their preparation. This article however deals only with those aspects concerning technology

equipment.

The visit

Although I had been on INSET courses and knew about the various types of technology equipment available to support blind students, I still felt that I needed to meet a pupil being supported in a similar situation to the one we had planned. I knew of a pupil in a neighbouring county, so I visited her to look at her provision and talk to her teacher about how she was being supported as the only blind pupil in a mainstream school. The support teacher, who would be working with our blind pupils, and our visual impairment technician also came on the visit. We all found this preparation invaluable.

Questions

We were hoping to find the answers to a number of questions which included:

- ☐ In what medium were our pupils going to communicate?
Braille, print or both.
- ☐ If a pupil used braille, how was it translated into print for mainstream teachers to read?
- ☐ How well did the student we were visiting cope using the equipment?
- ☐ What training would our pupils, support teacher and parents need?
- ☐ What provisions were made to repair and maintain the equipment for the pupil we were visiting? How could we set up appropriate arrangements in

- ☐ Where was the equipment for our pupil going to be stored and was it going to be insured?
- ☐ How much space would be available in the visually impaired resource room?
- ☐ How compatible would the equipment be with that already used in the school?
- ☐ What budget would be available to purchase the equipment?

We were able to discuss these questions during the visit and the responses we received were very helpful in helping us formulate our own strategies.

Further advice

We approached several other agencies with technology expertise in the area of visual impairment. For example, we spoke with the Foundation for the Communication of the Disabled and they advised us of equipment already being used with blind students. We were also able to talk to the RNIB technology service in London and to contacts at the National Council for Educational Technology. Finally I also talked to blind acquaintances to find out what they thought would be needed by the children in their new schools. With this research under our belts, we felt ready to move onto the next stage – the technology assessment of each pupil.

Technology assessment

It is crucial before purchasing any equipment to carry out a full technology assessment of the pupil to assess what is best for the individual child. Several agencies can perform such an assessment. My own authority for example, Hereford and Worcester, is

able to do this. RNIB Education Support Services has a specialist technology team who can perform assessments also. In Hereford and Worcester, we devised an extensive framework for assessing visually impaired children. Here are some of its constituent parts:

- ☐ Details of visual condition
- ☐ Other medical education issues such as specific learning difficulties or hand co-ordination difficulties
- ☐ Use of low vision aids for both distance and near vision
- ☐ Lighting needs
- ☐ Functional vision – both distant and near
- ☐ Field of vision
- ☐ Eccentric viewing techniques
- ☐ Fluctuating vision
- ☐ Colour vision
- ☐ Writing skills: handwriting and copy writing, dictation test and legibility
- ☐ Reading skills
- ☐ Typing skills
- ☐ Use of CCTV
- ☐ Wordprocessing skills
- ☐ Use of personal aid for writing/ note-taking
- ☐ Record of experience of aids in assessment.

We see the above as a framework and use it in all our in-house technology assessments. We find it helps to give us a full picture of the student's needs and also helps us to select appropriate technology to meet these needs.

Making decisions

When we completed our research and the pupils had received a formal

technology assessment we felt we were in a position to match technology to their needs. Both of our prospective blind pupils had been using braille in their previous school. However, both of them were anxious to use wordprocessing and already possessed some typing skills. Both students were able and competent to use technology aids. A parent of one of the pupils was computer literate and the child used an Archimedes computer at home with some speech facilities.

1995 was not an easy year to choose equipment. Windows 95 was soon to be upon us and we were unable to wait and see what speech synthesis it would support. Since a decision had to be made before September, it made sense to use something tried and tested. We therefore rejected Windows in favour of a DOS environment.

Specifications

This is the equipment we decided to buy for our pupils:

- ☐ 486 PC computer
- ☐ screen-reading software
- ☐ speech synthesiser
- ☐ embosser
- ☐ printer
- ☐ scanner
- ☐ Braille'n Speak
- ☐ HotSpot Fuser (for tactile diagrams)

The total cost came to approximately £6,500.

Teething troubles

We had a number of problems with the installation and running of the equipment. For example, we forgot to buy headphones which allowed the pupils to hear what was being said by the teacher but also allowed them to hear what they were brailleing and typing. We also had some trouble in choosing the correct DOS translation software that facilitates the translation of French into braille.

Installation and training

Obtaining the equipment is only part of any communication solution. Installation of the equipment and training in its use are also needed. We are fortunate in my authority to have a computer technician with responsibility for visual impairment who is part of our sensory services. Without the backup of our own technician, the smooth transition from special school to integrated setting would not have been as successful as it was with these two pupils. Our technician spent many hours loading software, sorting out problems, reloading computers when they crashed and training pupils and staff in the use of the equipment. Being able to respond at a moment's notice to technical is invaluable. Without this help problems have to be sorted out over the telephone or equipment has to be sent back to the supplier to be reset and so on.

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CD-ROM revolution

The CD-ROM publishing revolution has provided new opportunities and challenges for visually impaired learners. Roger Wilson-Hinds investigates.

A new publishing medium

From a small specialist field five years ago, the CD-ROM has made great strides into the publishing world and is fast making its mark in education too. The government has funded several CD-ROM projects. For example, the development of educational CD-ROMs and helping schools to purchase multimedia systems to use the discs. This article reviews the current situation for visually impaired children and suggests some possible solutions. For an introduction and definition of CD-ROMs, please see Chapter 2 pp22.

Most educational purchasers will be interested in paying anything between £20 and perhaps £700. Within this range you can find dictionaries, encyclopaedias, libraries of textbooks, Open University study material, sound effects, para-medical information, law notes and much, much more.

A single CD-ROM can contain a whole 20-volume encyclopaedia, several dictionaries or over 1,500 textbooks. What's more, it is possible to extract information and reproduce it in large print, braille or speech from some of these CD-ROMs. This is good news for blind or partially sighted students and everyone concerned with their access to information. What is not such good news is that access is far from complete. Nonetheless CD-ROM can still provide young learners with wonderful opportunities for acquiring information.

Many educational CD-ROMs contain brightly coloured pictures, photographs, video clips and sound effects as well as text. The usual way to work with these CD-ROMs is with a mouse and a point and click style of program. However, this method, as often as not, is not the only one. Frequently, there are keyboard routines for those who do not use a mouse. Finally, if even keyboard methods are not available, then the computer and the CD-ROM can be accessed by speaking commands. This is done by connecting a microphone or specialised switching mechanisms to the computer. This may be necessary where users have a physical disability.

Potential for learning

CD-ROM is a new learning medium for all children and represents a very special opportunity for visually impaired learners. The massive storage and multimedia features of the medium are so attractive. Access to this amount of information represents a breakthrough for many students with impaired vision. Reading in braille can be something of a labour and there are savage restrictions regarding what is at hand for immediate study. Reading clear print can be fatiguing for those with serious visual disabilities. And the audio cassette presents problems of random access because the information is in serial format.

In contrast, the CD-ROM stores information in electronic form. It is also

mainstream and currently fashionable technology – so it's robust and reasonably priced! Given the right access software and hardware, the CD-ROM offers the promise of speech, braille or large print, sound effects, clear pictures and video clips. An enormous enrichment for many children. Two illustrations make this point.

Microsoft Encarta95 is a top-selling encyclopaedia. Using an appropriate speech or magnification program for Windows, a blind or partially sighted student – with an acquired knowledge of the Encarta95 keystrokes – can read its articles, enjoy its sounds and videos and, where there is a little sight, enjoy the variety of pictures and illustrations within a 256 colour range. If you have never had normal vision, it's a thrill to enjoy such multimedia luxury.

On the other hand, a student can obtain for a few pounds, a CD-ROM containing all the Brontë literature. The writing can be magnified on the screen or listened to through synthetic speech. It can then be brailled or printed out as large as you like.

Children with multiple disabilities

CD-ROM offers real learning potential to younger children or students with severe learning difficulties. I put forward a suggestion here – not a case study. It would be a simple matter to scan into a computer, photographs of a child's family, home and the local neighbourhood. These photographs could be adapted using animation and art programs to provide early learning material for children with little or no vision. It is an equally straightforward

affair to record family voices into a computer using a microphone plugged into a sound card. By combining pictures and sounds, a database of familiar resources can be created. Normally, such resources take up too much memory on a computer's hard disc. However, the development of low cost CD-ROM recording units now means that the material can be written to a CD-ROM for a modest price.

Using voice recognition software, such as DragonDictate, a child can activate the CD-ROM database. The child could say 'Mummy', 'my dog' or 'my bed' and the associated photographic image will be commanded to appear on the computer screen. Similarly, recorded sounds could be evoked on command using standard sound files within MS Windows applications. Hundreds of sounds and pictures can be stored and quickly retrieved from one CD-ROM disc, potentially an extremely valuable learning resource.

New interaction styles

The last few years have seen dramatic changes in the ways people interact with computers. From a largely text-based screen environment many now find themselves working with a mouse, a pointer and a graphic screen. The new style of interaction or interface is called a graphical user interface (GUI). It makes for a screen full of icons (little pictures) which you point to and click on with the mouse. The screen can get cluttered and there may be very few words to guide the user. It is normally all about looking, having several windows in use on the same screen, choosing from complex dialogue boxes and clicking on toolbar buttons that look

like a printer, scissors or a pen and so on. It is a very different world from the early days of micro-computing when commands were given in text from the keyboard and the screen contained lots of words that could be magnified, spoken or turned into braille.

There seems to be a belief that visually impaired people will always have difficulty working with Windows. However, a lot of encouraging work has been done in this field. Access technologies do make it possible to use GUIs. Commercial programmers are leaving in 'hooks' for the developers, and training and support mechanisms are being developed to facilitate effective use of the GUI by the visually disabled user. Although the GUI may not be everyone's favourite way of working with their computer (even among sighted users), it will replace most DOS applications over the next few years or so.

In the USA and, to a lesser extent, here in the UK, visually impaired users are accessing Windows applications with varying degrees of success via speech, braille or large character. Of some 15,000 CD-ROMs available to the English-speaking world, few are still being produced in the DOS text format. In other words, students with weak or no sight are learning to cope with the clutter and confusion of the GUI small screen in the way that they solve other difficulties:

- ☐ they need help from sighted colleagues and professionals;
- ☐ they carry a great deal of knowledge in their heads – in this case a working knowledge of the appropriate keyboard combinations

which replicate mouse actions;

- ☐ they often struggle in isolation and appear slow in initial performance of tasks.

However, in time they become effective and speedy practitioners.

Coping with the GUI

Some solutions for access to Windows – and other GUIs – are now very much to hand. Several of the major software suppliers in this specialist field are offering solutions in various stages of 'perfection'. Large character access is most straightforward from the programmers point of view, although some users find it difficult seeing only a portion of the screen at any moment. Enlargement software currently starts at £155 for Magnus, and is in excess of £500 for a more sophisticated program. Braille display solutions remain expensive – in excess of £4,500 – whereas speech synthesis solutions range in price from £495 for Outspoken for Windows to just over £900 for ProTalk.

It is vital to shop around and for the user to view the goods before purchase to make sure that they are going to be suitable. For example, whereas Magnus copes well with the magnification of everything on-screen, there may be some trade-off in colour loss simply because it can currently only be used with 16 colour video.

One software solution is already on the market that offers speech output to an internal SoundBlaster card while, at the same time, offering a choice of text size on the screen. The trend among some visually impaired users is to make the best use of mainstream peripherals and avoid the need to purchase an

additional speech synthesiser. This can result in a considerable cost saving.

Alternative strategy

The software story is perhaps less than half of the access solution as far as blind and partially sighted students are concerned. The GUI interface is based upon the concept of manipulating objects on-screen using a mouse. For sighted people it's all very intuitive and requires much less training.

Unfortunately, this system pre-supposes the alert visual responses which many visually impaired learners lack.

Happily, in addition to the usual 'mouse' interaction the GUI offers a parallel form of interaction, which although not as complete as the graphical one, is nonetheless of real value to visually impaired users. For example, as long as programmers adhere to the advice and rules laid down by Microsoft, there should be alternative strategies to mouse actions to access MS Windows in the form of hot keys and other keystroke combinations. So those of us who see a little, or nothing at all, can access the GUI screen by picking up on the cues and clues that particularly help us and learning by heart the key commands that achieve specific tasks.

Some examples

Two examples demonstrate this alternative keyboard strategy.

The convention used here for entering information at the keyboard is as follows:

	use the keyboard
X	enter the letter X
<ENTER>	press the Enter key

<SPACE>	press the space bar
<ALT> - Y	hold down the Alt key, press Y, release Y and release the Alt key
<CTRL> - Z	hold down the Control key, press Z, release Z and release the Control key.

Changing font size

Within the MS Office Pro suite, a partially sighted user may want to enlarge the font size on screen. Typing the following key strokes in the document window will set up a font size of 24.

 <CTRL> - D	(opens Font dialogue box)
 <TAB>	(moves cursor to Font style box)
 <TAB>	(moves cursor to Font size box)
 24	(specifies size of text)
 <ENTER>	(executes command)

The whole process takes only three or four seconds.

Starting the Spellchecker

To spellcheck a completed document within Word 6 press the following two keystrokes in sequence:

 <ALT> - T	(activates the Tools menu)
 S	(selects spellcheck)

The spellcheck window pops up and is ready to process the document.

In principle then, a knowledge of the appropriate key strokes enables blind and partially sighted students to access

some of the currently available educational and commercial software applications which follow Microsoft guidelines.

Encarta95 encyclopaedia

Let's see how much access we can get using the keystroke approach with a Windows-based CD-ROM. The MS Encarta95 multimedia encyclopaedia is one of the most popular CD-ROMs in schools and homes. Normally the encyclopaedia is operated using a mouse; however a lot can be achieved using the keyboard only. While programmers incorporate key presses into the software, they don't always mention them in the manual. Consequently, it is often only by experimentation that a user finds out which keys activate which features.

To see what keyboard presses Encarta made available, I adopted a systematic testing style, going through each key combination in turn, in alphabetic order, and noted the CD-ROM's response to each press. By doing this, I discovered many undocumented features which increased my access considerably. It turned out that the Alt and Control keys were important ones to use in combination with the letters.

For my experiment I used a PC system with Magnus enlargement software and the Outspoken for Windows screen reader together with a Dolphin speech synthesiser. Encarta95 offers a print size option and this indeed may be suitable to students with useful vision. However, if magnification software is used there may be some loss of colour, because some magnification systems are restricted to 16 rather than the standard 256 colours.

Investigating the suitability of a new CD-ROM for visually impaired access is a matter of patience, experimentation and making notes as you work through the keyboard. The Encarta95 illustration is meant to indicate one way forward and to demonstrate that, even a visually cluttered popular CD-ROM, can be accessed via speech or magnification. I discovered many key presses from my experiments, presented in a factsheet at the end of this article.

A review of particular CD-ROMs

This section lists CD-ROMs which I feel will be of special value to students with a visual impairment. Windows-based discs are reviewed first, followed by some DOS-based discs. Many of these discs are available for Apple computers, and a few for the Acorn also. My own experience is with PC computers so I cannot vouch for what will work under other systems.

Access issues

Before mentioning specific CD-ROMs, it is worth mentioning that Keystone software from Aptech offers a partial solution to speech and large access. Keystone is a Windows text editor with large print and speech built into it. It offers a somewhat novel approach to accessing CD-ROM by copying an article to the Windows Clipboard. From here, it can be pasted into the Keystone Window, then you can hear or enlarge all the text, and edit it. It can then be saved, printed, brailled or incorporated into other documents.

Microsoft products for children

Microsoft have published some excellent education software including some

CD-ROMs. I review three of them here. Earlier, I described a keyboard approach to accessing Microsoft Encarta95. If only Microsoft itself and other manufacturers would stick to their own Windows programming guidelines and provide keyboard access to all CD-ROMs! Unfortunately they don't and so consistent keyboard access is not guaranteed.

Two of their best known products in this category are *Fine Artist* and *Creative Writer*. The first is a paint program and the second a word processor – both of them excellent. Even with relatively poor vision, a child can enjoy some of the benefits of both but by no means all. In both cases, the assistance of a sighted guide is needed to use many of the program features – although that will prove rewarding. Pointing with the mouse is essential and, as with the Dorling Kindersley CD-ROMs described overleaf, there is likely to be a considerable colour loss if magnification software is employed.

Microsoft *Musical Instruments* is more user-friendly for those with little or no sight after a good deal of tuition. But even though the musical sounds of the instruments of the world can be accessed and enjoyed via a sound card, the text and fact books will not speak and cannot easily be printed large. From the keyboard, <ALT> - <I> brings up the index dialogue box, a long list of musical instruments from all parts of the world.

Playing the sounds is unfortunately not an easy to access menu item, but the 'sound' command can be labelled so that a totally blind user can choose an instrument and have it played. As with so many CD-ROMs there is a strong argument for having *Musical Instruments*

as a resource, even if only the sighted partner operates the system, as the listening rewards are so fascinating.

Encyclopaedia Britannica

The Windows-based CD-ROM version 1.01 of Encyclopaedia Britannica costs £695 and contains 44 million words of text. As a school library resource it is really invaluable.

This disc works with magnification software and screen-reading software, so blind and partially sighted users will find it of great value. There are keyboard alternatives to most, but not all, mouse functions. However, information about these key presses needs to be hunted out from scattered references within the manual. And time needs to be spent discovering others. With practice, however, such strategies can be fast and effective when used with speech or magnification.

Britannica offers a typical Windows pull-down menu system and you will feel familiar with options like <Alt> - F for file business and <Alt> - V for viewing and so on. However, the saving and storing of multiple research inquiry references is not straightforward. Britannica presents a specific problem for totally blind users, since the mouse is required to highlight as well as save the articles. To get around this problem, I suggest setting up the Windows Print Manager to print to disc and set the default printer to generic. In this way each article can be saved on disc and edited later via speech or braille. Someone with a comprehensive knowledge of Windows can help sort this situation out if you do not understand how to use Print Manager in this way.

Note that braille and large type printouts are easy to obtain with appropriate translation software.

Dorling Kindersley products

Famous for its Eye-Witness series of books, Dorling Kindersley have successfully translated several of their books into discs. Among the titles are *The Way Things Work* and *My First Incredible Amazing Dictionary*. This series is enjoyed by children. However, there are seemingly insoluble access difficulties for would-be users with extremely low vision or no sight. Keyboard access is virtually denied, speech access is out of the question and the whole style and presentation assumes normal or useful sight. At the time of writing, most of the magnification software programs make a poor show with the Dorling Kindersley CD-ROMs. Either the screen breaks up or there is magnification with a serious colour deficit. We can certainly anticipate improvements in screen magnification software in the near future. However, for the present do be aware that these discs are likely to be 'out of reach' of most visually impaired children.

Other Windows CD-ROMs

There is a wide range of resources. Here are a few which have caught my interest. At the end of this article, I list some top selling CD-ROMs to give you an idea of what is proving to be popular with the visually impaired community. Prices are approximate.

Great Mystery Classics

This is a collection of classical largely non-copyright literature which can be useful for students in exam classes. *Price: £15.*

Macmillan's Dictionary for Children

This illustrated children's dictionary is targeted at the primary school sector. *Price: £25.*

Oxford Word Shelf

A useful general reference resource for students, it contains various dictionaries and reference works. *Price: £30*

Industrial Revolution

This CD contains a mass of documentation and illustrations about this historical period. *Price: £100*

DOS-based CD-ROMs

Fewer and fewer discs are now being made available in the DOS format, so they are getting rather rare. However, when you do find one, it can prove to be very cheap. Those wishing to remain within the DOS environment, would do well to snap up any of the DOS CD-ROMs mentioned below. You may find the following criteria useful when talking to a supplier and deciding whether a particular CD-ROM is likely to be suitable for a visually impaired user.

- ☐ The CD-ROM is DOS-based, and that includes dual boot discs, eg Mac and DOS
- ☐ It is text, not graphics-based
- ☐ There are keyboard alternatives to mouse control
- ☐ The user can save logical chunks of text to ASCII file
- ☐ If large print or braille output is required: the cursor follows the screen to the point of attention, rather than remaining parked.
- ☐ Ideally, text will be stored in ASCII format.

The CD-ROMs listed below have good speech and magnification access. They were tested using HAL, Lunar and VocalEyes software.

Changing Times

Masses of historical extracts from the Times Newspaper over the past 200 years. *Price: POA*

Collins Dictionary

Can be used in DOS or Windows environment. It loads into resident memory and can be accessed from the DOS prompt or your word processor while you are working. *Price: POA*

Infocom Games

This disc contains text-based games – lots of words and puzzles. *Price: POA*

Information Finder

Bulging with detailed information on every country of the world. *Price: POA*

Library of the Future

I think all versions are accessible. These discs are massive collections of mainly non-copyright books, poems and classic works. *Price: £43*

Other DOS CD-ROMs

The following are untested, but are reputed to work well with speech:

Complete works of Jane Austen.

Price: £19

Complete works of Lewis Carroll

Price: £19

Famous Novels

Price: £22

Great Literature

Price: £52

Great Poetry Classics

Price: £13

Monarch Notes

Students notes on classical literature, A-level standard. *Price: £53*

Science Navigator

Dictionary / encyclopaedia of science. *Price: £90*

Shakespeare Study Guide

Price: £13

Top selling discs

Here is a list of CD-ROMs that are proving to be popular with visually impaired users. The information was supplied by Cambridge CD-ROM Ltd.

- ☐ Collins English Dictionary and Thesaurus
- ☐ Information Finder
- ☐ Library of the Future vol 1
- ☐ Library of the Future vol 2
- ☐ Library of the Future vol 3
- ☐ Oxford English Reference Library
- ☐ Science Navigator
- ☐ Shakespeare on Disc
- ☐ Sherlock Holmes on Disc
- ☐ Software Toolworks Encyclopaedia.

Useful addresses

It is possible to purchase a wide range of CD-ROMs in high street stores but beware, because almost all will be MS Windows-based and will not function properly, for example, with DOS access computer equipment. When approaching any companies it is vital to say if you are only able to work in DOS. You may have to do some hunting in order to find your CD-ROM. We include overleaf a list of suppliers to help you with your search.

Cambridge CD-ROM Company, Combs Tannery, Stowmarket, Suffolk, IP14 2EN. Tel: 01449-774658. Fax: 01449-677600. Supply a full range of CD-ROMs plus hardware.

Shareware Library, Winscombe House, Beacon Road, Crowborough, Sussex TN6 1UL. Tel: 01892-663298. Supply a range of CD-ROMs.

CD-ROM Systems (Europe) Ltd, 4 Lloyds Court, Manor Royal, Crawley, West Sussex RH10 2XT. Tel: 01293-525271. Fax: 01293-562066. Supply a range of CD-ROMs plus hardware.

Choice Technology & Training, 7 The Rookery, Orton Wistow, Peterborough, PE2 6YT. Tel/Fax: 01733-234441. Compiled this article and can offer independent advice on CD-ROMs for blind and partially-sighted users to individuals, libraries and educational establishments.

Dolphin Systems for People with Disabilities Ltd, PO Box 83 Worcester WR3 8TU. Tel: 01905-754577. Fax: 01905-754559. Will create HAL speech environment where appropriate and supply Lunar for Windows magnification software.

Interactive Ideas, 276-278 Chase Rd, Southgate, London N14 6HA. Tel: 0181-447 9288. Fax: 0181-447 8944.

Koch Media, East Street, Farnham, Surrey GU9 7XX. Tel: 01252-717520. Wide range of discs supplied.

CD-ROM Distributions, Mowbray House, Mowbray Street, Stockport, Cheshire. Tel: 0161-429 0241. Carries a wide range of CD-ROMs competitively priced.

World Wide Web

URL: <http://ncet.csv.warwick.ac.uk/WWW/projects/CD-ROM/evaluations/index.html>

Comprehensive review of CD-ROMs for primary schools. Note focus is not on access for visual impairment.

A word about prices

A quad speed CD-ROM drive – don't accept anything slower – is now available for under £200 from local stockists. High street stores offer multimedia deals with the CD-ROM drive as part of the total PC package.

As for discs, the general trend is falling prices and it is well worth ringing round the various suppliers to get different quotes. Some of the Shareware collection discs sell for under £20 and many are available below the £40 mark for the DOS version. Windows software such as Microsoft Office Pro, The Smart Suite, Windows 95 and an increasing number of other applications are now being sold in CD-ROM versions.

Roger Wilson-Hinds has used computers with visually impaired children since the early 1980s. Visually impaired himself, he now runs Choice Technology, a training company where he provides access advice to individuals, colleges, libraries, schools and other institutions.

Encarta95 from the keyboard: a factsheet

Starting Encarta95 from the DOS prompt

Here's how you start from the DOS prompt:

-  **WIN** type at C:\> prompt
-  **<ENTER>**
- ... wait for Windows to start up
-  **<ALT> - W** lists all the folders that hold program icons
-  **↓** press vertical cursor key to find multimedia window
-  **<ENTER>** opens multimedia window
-  **↓↑→←** use cursor keys to locate Encarta icon
-  **<ENTER>** starts up Encarta
-  **<ENTER>** press when title screen displays

Selecting a View option

There are three viewing options: text only, text with outline, and text and picture (main). The 'text only' option is especially useful for speech users because there is less screen clutter.

-  **<ALT> - V** displays view menu
-  **T** for text only
-  **O** for text with outline
-  **M** for main (text and picture)

Finding an article

As an example, here is a way of finding information about lions:

-  **<ALT> - F** opens find dialogue box
-  **LION** enter 'lion' into search box

-  **<ENTER>** starts search topic window appears on screen
-  **<SPACE>** selects top article for display

Repeat these steps for a new search.

Making a backward search

This option takes you back through the pages you have already looked at. Each press takes you back to an earlier page.

-  **<ALT> - B** moves you back one search

Listing areas of interest

This is useful to help your searching.

-  **<ALT> - A** lists areas of interest:
 - Physics, Science & Technology
 - Life Sciences
 - Geography
 - History
 - Social Science
 - Religion & Philosophy
 - Art, Language & Literature
 - Performing Arts
 - Sports, Hobbies & Pets

Related articles

This activates search categories within the area of interest chosen.

-  **<ALT> - C** brings up category menu
-  **↓** moves from category to category
-  **<ENTER>** selects category & displays find box

Continue as in 'Finding an article' above.

Display features menu

This option helps searching using other reference tools.

-  <ALT> - E displays Features menu
-  A Atlas
-  G Media Gallery
-  T Timeline
-  M MindMaze

Display image menu

To work with an image – where the topic has one.

-  <ALT> - M displays image menu options
-  ↓ & <ENTER> enlarges image on screen
-  C copy image
-  P print image

Display text menu

This menu allows the text to be manipulated.

-  <ALT> - D displays text menu
-  <ENTER> copy article to clipboard
-  S small text

-  M medium text
-  L large text

Open word processor for use with Encarta

This can be useful for saving text from the CD-ROM.

-  <ALT> - T tools menu displays
-  W selects word processor, e.g. WordPad

Display map of the world

To display the map of the world and gain access to the atlas:

-  <ALT> - E tools menu - Atlas highlighted
-  <ENTER> world map displayed

Help with Encarta

If you need assistance with using Encarta you can call up the Help pages.

-  <ALT> - H displays help

Exit Encarta

These key presses will take you back to the Program Manager.

-  <ALT> - W displays Window menu
-  C closes Encarta

Opening electronic highways

Surfing the Internet has opened up exciting new opportunities for visually impaired learners. Peter Boshier offers a personal perspective.

The Internet represents a wonderful new resource for visually impaired people. It is important because the information is stored in electronic form, making it accessible through a computer. With electronic information, a visually impaired person does not need to rely on other people getting material on to tape; this is a real bonus which sidesteps the time delay of recording. Also avoided is the subsequent struggle to locate individual items on the tape.

Information from the Internet, can be stored and read on a PC. A huge contrast to the time, expertise and shelf space consumed by braille production. The computer does not have the search limitations of cassette and braille. Software helps you search for the information you want in seconds and get it read back through a speech synthesiser or displayed large on your screen. You could then have the PC take an extract of the information and have it turned into large print or braille.

What is the Internet?

The Internet is a global computer network comprising hundreds of smaller networks joined together by the telephone system. These networks are maintained by governments, universities and large companies. Individuals use the Internet by connecting to their nearest access point, usually via a phone line. For example, a school's computer, once linked into the Internet, has the

ability to connect to a classroom in Singapore or to the large central computer at the British Library or to Harvard University in the USA.

A computer may be connected to the Internet permanently via a high-speed link or it may use a modem (which links a computer to the telephone network). The Internet offers many different services: electronic mail, access to files, World Wide Web, discussion groups and on-line chat to name but a few.

What is the value of the Internet?

The amount and range of information the Internet holds is staggering. You can have the bible, an Oxford dictionary, Delia Smith's cook books, all of the Beatles' song music, today's newspaper, most of classical literature and much more. All of it is delivered to your computer from a distant network, for the price of a local phone call.

Most people use the Internet to send and receive messages by electronic mail. Each Internet user has a unique Email address allowing almost instant communication between everyone, no matter where they are in the world.

Another popular use of the Internet is to take part in the discussion forums called Usenet news groups. These are a good way of gathering and disseminating news and information on a wide range of topics.

Perhaps the most talked about feature of the Internet, however, is the World Wide Web. This is a gigantic collection of multimedia pages on an enormous range of subjects. The pages are authored by an extraordinary number of organisations, companies and individuals. The web is the fastest growing and most powerful part of the Internet – particularly valuable in that it is easy to use. However, the unstructured nature of the web means that it can be difficult to locate what you're looking for.

In the long-term, it will be necessary for everyone to use Windows-type software to access the Internet. However, for the moment, you can still do most of what you need using text-based programs. There is a very good text-based browser program called Lynx which enables you to browse the web. A couple of other DOS browsers (as programs for using the Web are called), have so far not proved as effective as Lynx.

Advantages of the Internet

In my view the two most important advantages of the Internet are its powers of remote communication and the wealth of information it holds.

The Internet offers great speed and flexibility in communicating information remotely. Resources at one site can be used by a teacher whose pupils are spread out over a wide geographical area. All the participants are able to see or hear text and audiovisual material. This feature of the Internet can be employed for language learning or studying geography; it can help teachers and students in different countries to communicate easily and share resources.

The Internet holds an unimaginable wealth of resources – of both text and audiovisual material which can be retrieved from anywhere in the world. This prospect is exciting enough for anyone, but for visually impaired people, the contrast between the Internet's resources, and the tremendous lack of course material in other accessible formats which they have been accustomed to until now, makes the Internet almost irresistible.

Getting started?

It is a good idea to see someone else's system in operation, to get a grasp of how the Internet works. You will need the right hardware and software for your computer. Finally, you will require an access provider who will handle the local link from your computer into the Internet. You pay a monthly subscription for this link and local telephone charges while connected to the Internet.

What resources do I need?

You need a modem and a phone line as well as a computer. The computer should be (for a PC) at least a 386 with 2 Mb of RAM, and ideally support 256 colours, and have a sound card.

Your access provider gives you software to get you going. For direct Internet access, your best bet at the time of writing is probably Demon Internet Services. This company provides a suite of programs which run under MS-DOS and work with speech or braille.

How much will it cost?

High-speed direct links are expensive and suited to larger establishments with a department to look after the

connection. To get started with a simple 'dial-up' connection, you need a modem. Expect to pay around £100 for one that is reliable and reasonably fast. You should look for one rated at 14,400, since anything less would become frustratingly slow and cost more in phone-bills than you would save by buying a cheaper modem. Among the better makes of modem are US Robotics and Pace.

Subscribing to an access provider will cost between £5-15 per month plus – in some cases – additional charges for time spent on-line. On top of this, of course, there is the telephone bill! You pay this for the time you remain connected to the Internet. Be prepared to spend some time at the start, learning how to use the software and the dial-up system.

What should I start with?

The learning curve for the Internet is undeniably very steep. It might be best to begin by learning to use Email. This is an essential skill for everyone. Learn about **netiquette** – the correct way to address other Net users. If you have a question, look for **FAQ** (frequently asked questions) files. These are all over the Internet and are designed to help newcomers learn the ropes. You can then progress to spending time browsing the Web. This is intuitive and full of fascinating information. You will learn to send messages and download files in a simple way.

When you join mailing lists (sometimes called Listservers), another very useful source of information for common-interest groups, limit yourself to a couple of discussion groups to begin with – otherwise you will be drowned with postings.

Moral issues & possible solutions

Worries have rightly been expressed about access by children to unsuitable material. Broadly, three methods are being adopted to protect children. The first is to allow children free access but to supervise their activities. The second way is to use an access provider which only allows access to a subset of the Internet – a kind of 'walled garden' which permits the children to explore freely but which blocks off areas deemed to be unsuitable. The third approach is to install protection software on the computer; the software acts as a filter and bans access to inappropriate sites.

The future

There seems little doubt that the Internet is going to have a large place in all our lives and, if politicians are to be believed, in our schools and libraries sooner rather than later. Consultation is under way to see how this might be best achieved. For visually impaired students, this cannot come about too soon. The opportunities offered by this technology are potentially enormous.

There will be some important obstacles to circumvent before access is as we would want it: for example cheap and universal Internet availability, low telephone charges and easy access to graphical user interfaces. Nonetheless, the technology is advancing at a fast pace and much of this should be with us before too long.

Factfile

There are plenty of education projects present on the web. Here are a few that you can visit to get you started. Note that web addresses (URLs) change from

time to time, so expect some disappointments occasionally.

BushNet schools

The BushNet schools are scattered across 6,000 square kilometres of far North Queensland Australia, from the rain forest at Julatten to the dry bushlands of Chillagoe, home of the famous Chillagoe Caves. The BushNet schools range in size from Irvinebank with a single teacher-principal and eight students to Mareeba State School with more than 600 students.

URL: <http://www.bushnet.qld.edu.au/schools.html>

Campus World

CampusWorld is an Internet environment from BT for learners and educators. The services, materials and activities will support teaching and learning in school, college and home. Although full access to the wider Internet is available, CampusWorld is a managed, safe environment which stimulates interaction and participation in worldwide activities without the danger associated with access to undesirable sites.

URL: <http://www.campus.bt.com/CampusWorld/pub/CampusWorld/>

CyberKids

CyberKids is a place for kids to learn and have fun. There is a free online magazine which contains stories and artwork created by kids. They can have fun doing puzzles and playing games.

URL: <http://www.mtlake.com/cyberkids/>

Kids Web

This is a World Wide Web digital library for school children. The documents accessed from this library are on Web servers all over the world. Links to these computers may be very slow or even temporarily inaccessible. Museum visits are available from this site.

URL: <http://www.npac.syr.edu/textbook/kidsweb/>

Project Gutenberg Master Index

This is an unofficial list of the Project Gutenberg electronic texts. Most of these texts are in the public domain and have extensive legal 'small print' at the top. The links on this page point back to the 'official' sources at UIUC, which are in plain ASCII format. An excellent site for electronic texts.

URL: <http://192.76.144.75/books/gutenberg/gutenberg.html>

RNIB

RNIB has its own web presence on the Internet. Contact this comprehensive site for online information about a wide range of educational services, informative factsheets about visual impairment and material on access technology too!

URL: <http://www.rnib.org.uk/>

Schools OnLine

A UK project involving some fifty secondary schools. At the time of writing, the project has just begun – so watch this space for developments.

URL: http://sol.ultralab.anglia.ac.uk/pages/schools_online/

Peter Boshier is blind. He is an active user of the Internet and is co-ordinating RNIB's activities on Super Highways.

Information and support

Organisations and centres

ACE Centre – Aids for Communication in Education Centre

ACE Centres provide information, assessment and expertise in the use of technology to help children with communication difficulties. They hold many different devices, including switches, special keyboards, voice synthesisers, and portable computers. These are used for demonstration, assessment and training. The centres also produce software and publications.

ACE Centre
Ormerod School
Waynflete Road
Headington
Oxford OX3 8DD
Tel. 01865-63508
Fax 01865-750188

ACE/ACCESS Centre
1 Broadbent Road
Watersheddings
Oldham OL8 2PY
Tel. 0161-627 1358
Fax 0161-627 0363

British Computer Association of the Blind

BCAB was formed to cover all aspects of computing and visual impairment. There is a regular newsletter and an exhibition is held annually.

British Computer Association of the Blind
BCM Box 950
London WC1N 3XX

CENMAC (Centre for micro-assisted communication)

For more than 20 years CENMAC has been involved in the assessment and support of children (and young people) whose educational progress is hindered by their physical inability to communicate effectively either in speech or writing. CENMAC's main activities include: assessment and monitoring of needs; supply and maintenance of equipment; modifying and tailoring of equipment to individual needs; the development of new resources; and supporting and training staff.

CENMAC
Eltham Green Complex
1a Middle Park Avenue
London SE9 5HL
Tel. 0181-850 9229
Fax 0181-850 9220

Electronic Aids for the Blind

EAB is a charity with a national remit to enhance the independence of blind and visually impaired people through the provision of specialist or suitably adapted electronic equipment. EAB will raise funds for the purchase of equipment. Target groups are wide but include, for example, children in

mainstream education who have their equipment provided by the LEA for use at school but who require similar equipment at home to permit homework and effective study.

Electronic Aids for the Blind
Suite 4B, 73-75 High St, Chislehurst
Kent BR7 7AG
Tel. 0181-295 3636
Fax 0181-295 3737

Eureka users group
Publishes a quarterly newsletter on disk.
Contact person: Elenor Tew
Tel. 01823-272863

Jotta users group
Contact this group for support if you are a Jotta user.

Jotta users group
c/o Mike Cosgrove
8 Wandsworth Rd, Heaton
Newcastle-upon-Tyne NE6 5AD
Tel. 0191-265 6345

NASEN (National Association for Special Educational Needs)
NASEN's aims include: the promotion of the development of children and young people with special educational needs; influencing the quality of provision for these children. Activities include advice and support, the provision of courses, conferences and meetings and the publication of two journals.

NASEN
York House, Exhall Grange
Wheelwright Lane
Coventry CV7 9HP
Tel. 01203-362414 (24 hours)
Fax 01203-362414

National Council for Educational Technology (NCET)
This national organisation promotes the

use of new and existing technologies to enhance learning opportunities in all areas of education and training. NCET has funded a number of innovative projects in the use of computers and speech systems for both children and adults who have a visual impairment. The outcome of these projects and research into other areas of special education is published in a number of occasional papers, free information sheets and reports.

National Council for Educational Technology
Milburn Hill Road, Science Park
Coventry CV4 7JJ
Tel. 01203-416994
Fax 01203-411418

National Federation of Access Centres
There are currently 19 of these centres attached to institutes of further and higher education and vocational training throughout the country. While primarily concerned with the assessment of physically disabled students some also offer assistance to visually impaired students. The Royal National College in Hereford and RNIB Vocational College in Loughborough are specialist residential colleges for visually impaired students and designated as Access Centres. For further information contact the national co-ordinator at:

The National ACCESS Centre
Hereward College of Further Education
Bramston Crescent, Tile Hill Lane
Coventry CV4 9SW
Tel. 01203-461231
Fax 01203-694305

RCEVH (Research Centre for the Education of the Visually Handicapped)
This is a well-established organisation

whose activities include the production and modification of software, a regular newsletter and a series of research papers. Primary and secondary curriculum working groups also meet at the RCEVH and produce educational materials for use in schools.

RCEVH

School of Education
University of Birmingham
Edgbaston, Birmingham B15 2TT
Tel. 0121-414 6733
Fax 0121-414 4865

Redbridge SERC

This is a technology resource centre for special needs with expertise in the use of computers by people with all types of disabilities. It is also an Apple Regional Information Centre with a special needs focus and provides information nationally about disability solutions using the Apple Macintosh computer.

Redbridge SERC
Little Heath School
Hainault Road, Little Heath
Romford RM6 5RX
Tel. 0181-597 7848
Fax 0181-590 8953

RNIB Education Information Service
RNIB Education Information Service produces over 100 publications and responds to enquiries from parents and professionals about the needs of visually impaired children.

RNIB Education Information Service
224 Great Portland Street
London W1N 6AA
Tel. 0171-388 1266
Fax 0171-383 4921

RNIB Employment Development and Technology Unit (EDTU)
EDTU offers technical support for visually impaired people in, or seeking,

employment. It supports, advises and provides information for any organisation which employs or is considering employing visually impaired staff. Very useful factsheets and bulletins on technology and visual impairment are regularly produced.

RNIB Employment Development and Technology Unit (EDTU)
224 Great Portland Street
London W1N 6AA
Tel. 0171-388 1266
Fax 0171-383 7613

RNIB National Education Services Technology Team

This service provides support and information for teachers and others involved with the education of visually impaired children. The technology team offers:

- ☐ short and long course INSET in the use of technology
- ☐ technology assessment for pupils
- ☐ technology publications
- ☐ a permanent exhibition of specialised technology
- ☐ information, advice and support on technology

RNIB Technology Team
Garrow House
190 Kensal Road
London W10 5BT
Tel. 0181-968 8600
Fax 0181-960 3593

RNIB Education Centres

These centres provide support for visually impaired pupils. They have a wide educational remit and the use of technology forms part of it. Each centre has an exhibition of technology and can offer support and advice in its use. Five

centres are currently operational.
These are:

RNIB Education Centre: London
Garrow House
190 Kensal Road
London W10 5BT
Tel. 0181-968 8600
Fax 0181-960 3593

RNIB Education Centre: Midlands
c/o RNIB New College
Whittington Road
Worcester WR5 2JX
Tel. 01905-357635
Fax 01905-764867

RNIB Education Centre: North
Grosvenor House
Grosvenor Rd, Headingley
Leeds LS6 2DZ
Tel. 0113-274 8855
Fax 0113-274 8800

RNIB Education Centre: Wales
Fourth Floor, 33/35 Cathedral Rd
Cardiff CF1 2HB
Tel. 01222-668606
Fax 01222-641915

RNIB Education Centre: Scotland
10 Magdala Crescent
Edinburgh EH12 5BE
Tel. 0131-313 1876
Fax 0131-313 1875

RNIB Resource Centre

This Centre at RNIB's central London headquarters has a sales counter and a permanent exhibition of high and low technology that can be tried by visitors.

RNIB Resource Centre
224 Great Portland Street
London W1N 6AA
Tel. 0171-388 1266

RNIB Student Support Service

This RNIB Service assists visually impaired students working in further and higher education. It operates an equipment scheme and can advise students about the purchase of technology suitable for study.

RNIB Student Support Service
PO Box 49, Loughborough
Leicestershire LE11 3DG
Tel. 01509-211995
Fax 01509-232013

Scottish Sensory Centre

This centre has a resource area with examples of technology used in the education of children and young people with visual impairment. The centre's role is to support innovation and good practice in the education of young people with sensory impairment.

Scottish Sensory Centre
Moray House Institute of Education
Holyrood Road
Edinburgh EH8 8AQ
Tel. 0131-558 6501
Fax 0131-558 6502

SNUG (Special Needs User Group)

SNUG is a voluntary group which aims to promote the use of computers for people with special needs. SNUG publishes the journal 'Special Needs Computing' and a newsletter. A network of local groups and contacts is being developed.

SNUG (Special Needs User Group)
39 Eccleston Gardens
St Helens WA10 3BJ
Tel. 01744-24608

SEMERC

SEMERC is a lively centre which produces and publishes many technology materials for use with

children with special educational needs. It has catalogues of products which can be used with BBC, Archimedes, RM Nimbus/PC and Apple computers. It also offers technology training, consultancy and information.

SEMERC

1 Broadbent Road, Watersheddings
Oldham OL8 2PY
Tel. 0161-627 4469
Fax 0161-627 2381

VIS

VIS is an information service designed for the visually impaired community. There is a large technology section. It is distributed in three formats: on-line, floppy disc and print. For further information contact:

Scottish Sensory Centre
Moray House Institute of Education
Holyrood Road
Edinburgh EH8 8AQ
Tel. 0131-558 6501
Fax 0131-558 6502

Visually Impaired Persons Computer User Group (VIPCUG)

This organisation is a self-help group covering all aspects of computing and visual impairment.

VIPCUG, c/o The Manor House,
Fleckney, Leicestershire.

Publications

A number of periodicals cover technology and visual impairment. Some are specialist technology publications, others publish occasional articles relevant to the field.

British Journal of Special Education

The British Journal of Special Education aims to cover the whole range of learning difficulties and disabilities,

both in special and mainstream schools. There is a regular computer page. For a sample copy write to: Journals Marketing Manager, Blackwell Publishers, 108 Cowley Rd, Oxford OX4 1JS

British Journal of Visual Impairment

This is a well-established periodical that covers all aspects of visual impairment. It is addressed to all those professionally concerned with children and adults who have a visual impairment and is a national forum for all views on related subjects. It is published in March, July and November. Editorial Address: 108 High Street, Hurstpierpoint, West Sussex BN6 9PX

Educational Computing and Technology

This journal specialises in computing for schools. It includes news, reviews and information on most aspects of educational computing. Published eight times per year by Training Information Network Ltd, Jubilee House, The Oaks, Ruislip, Middx HA4 7LF

eye contact

This journal focuses on the needs of children with impaired vision who have additional learning difficulties. Full of news and views, it is a magazine for parents and professionals. It also contains articles highlighting work done in special schools around the country, and has regular technology features. It is published termly by RNIB Education Information Service, 224 Great Portland Street, London W1N 6AA
Tel. 0171-388 1266 ext 2297

Journal of Visual Impairment and Blindness

This periodical is an interdisciplinary journal for practitioners and researchers

professionally concerned with blind and visually impaired persons. It provides a forum for wide ranging views and seeks to draw on many different disciplines in order to further work for visually impaired people. Published every two months by the American Foundation for the Blind, 15 W. 16th St., New York, NY 10011, USA

New Beacon

A monthly magazine for people with a visual impairment, their families and friends. It is also aimed at helpers, both voluntary and professional. Full of news and views, with articles on subjects from advances in new technology to arts and leisure pursuits. Distributed monthly by Customer Services, RNIB, PO Box 173, Peterborough PE2 6WS
Tel. 01733-370777

The Times Educational Supplement

This well known national supplement has a weekly computer page and occasional pull-outs on technology. Published every Friday by The Times Supplements Ltd, Admiral House, 66-68 East Smithfield, London E1 9XY
Tel. 0171-782 3000

Centre Software

This RCEVH journal concentrates almost exclusively on visual impairment and computing with particular emphasis on additional needs and technology. RCEVH also produce a large range of specialist software and this is advertised in every issue. It is published quarterly by the Research Centre for the Education of the Visually Handicapped, School of Education, University of Birmingham, Edgbaston, Birmingham B15 2TT Tel. 0121-414 6733

Special Children

This independent magazine focusing on children with special needs is published

nine times a year. It carries news, views and information with occasional special features on technology. Editorial Office: 27 Fredrick Street Hockley, Birmingham B1 3HH Tel. 0121-212 0919

Special Needs Computing: the Journal

The Special Needs User Group publish this magazine which contains articles describing how computers are used to help people with special needs. It also documents recent research developments. Special Needs User Group, 39 Eccleston Gardens, St Helens WA10 3BJ Tel. 01744-24608

Special Needs IT

Targeted at professionals and parents, Special Needs IT gives a broad coverage to technology for special educational needs. Published termly by SEMERC, 1 Broadbent Rd, Watersheddings, Oldham OL8 2PY
Tel. 0161-627 4469

VIDE (Visually Impaired learners Database of Educational materials)

VIDE is a bibliographic database of alternative format text, primarily braille and cassette tape, suitable for visually impaired children in formal education. It is fully compatible with library records and is accessed through a purpose-built set of search tools suitable for non-computer literate people. For details contact: RNIB Book Sales Service, Garrow House 190 Kensal Rd, London W10 5BT
Tel. 0181-968 8600

Visibility

Visibility is for parents and professionals concerned with the education of visually impaired children. Published termly by RNIB Education Information Service, 224 Great Portland Street, London W1N 6AA
Tel. 0171-388 1266 ext 2297

Suppliers' directory

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Glossary

A

Application package

A computer program that allows the user to apply the computer in some way. Common examples are word processor, spreadsheet and database.

ASCII

Short for American Standard Code for Information Interchange. Many programs allow you to save a file in ASCII format. This makes it possible to use the file with different programs. However, a cost is involved – only the text is saved. All formatting commands created by the parent program are stripped out of the file.

B

Baud rate

The number of changes per second in the electrical signal. The size of the baud rate indicates how quickly data is being transmitted from the computer to another device, eg to a printer. High baud rates mean fast transfer.

BBC computer

Computer manufactured by Acorn in the 1980s for use in a TV computer literacy series.

Braille display

A line of cells, each with 6 or 8 pins that

move up and down to represent the dots of a braille cell. The display is used to represent a line of text on the computer screen. Also called 'soft' or 'refreshable' braille.

Braille keyboard

A keyboard modelled on the Perkins brailler; at its heart it has six dot keys and a space bar.

BUM

Braille user manual.

Byte

A measure of computer memory. One byte stores a single character.

C

CGA

Short for Colour Graphics Adapter. It was the first video adapter for the PC that displayed colours. CGA displays only four colours on a monitor at one time.

CD-ROM

Short for Compact Disc Read Only Memory. A disc that looks like a compact audio disc; it stores large amounts of information in the form of text, pictures and sounds.

Compatibility

The ability of one component to work

without errors with another component.

Concept Keyboard

A touch sensitive A4 or A3 size board which plugs into a computer to provide an alternative to a standard qwerty keyboard; areas of the board can be programmed to send text and pictures to the computer.

CPS

Short for characters per second. This is the speed which a printer or embosser is able to print text on paper.

CPU

Short for Central Processing Unit. The CPU is the 'brain' of the computer system. - physically it is a microprocessor or 'chip'.

Cursor

A marker (usually flashing) on the computer screen. It shows where the next typed character will be placed.

D**Database**

A program which stores, organises and retrieves information. It is a sort of electronic filing cabinet with analytic and reporting features.

Dot matrix printer

An inexpensive printer which creates characters and graphics by striking the paper with a print head composed of pins. The quality of the print lacks the good contrast produced by inkjet and laser printers.

DOS

Short for Disc Operating System. It is a program which allows parts of a computer system to communicate with

the CPU. DOS is a text-based style of communication.

E**Embosser**

A braille printer.

Environment file

A file to be used with an application program and a magnification or screen reading program. The environment file sets up a customised working environment so that the user can employ an application program as efficiently as possible.

Expansion card

A circuit board which is inserted into the computer. Many computer accessories come with an expansion card, eg CD-ROM drive.

F**Fan-fold**

Continuous feed paper with perforations at regular intervals and holes down the sides. The holes mesh with a tractor feed in the printer or embosser.

Floppy disc

A flexible magnetically coated plastic disc which is used for storing computer files.

File

A program or set of information stored on a disc.

Font

Any set of characters with the same typeface and type size.

G

Grade 1 braille

The simplest form of braille where each letter of the alphabet is represented by a braille symbol composed of an arrangement of up to six dots.

Grade 2 braille

Braille code in which parts of words or whole words are replaced with a braille character or characters. It is widely used by braillists.

GUI

Short for Graphical User Interface. A style of communicating with a computer based on the direct manipulation of graphics (see Microsoft Windows).

H

Hardcopy

A printed version of a document, picture or anything else you've created with a computer.

Hard disc

A computer disc drive that stores large amounts of information. It is usually permanently installed inside the computer.

Hardware

The physical parts of a computer system - keyboard, cables, monitor and so on.

I

IBM

Short for International Business Machines. It is the name of the world's largest computer manufacturer that set the PC standard for most business computer systems.

IBM PC Compatible

A computer capable of running software designed to work with IBM PC computers.

Icon

A small picture that represents something - often a program or document. Icons are used extensively in graphical user interfaces.

Inkjet printer

A printer which forms letters on paper by squirting ink out of a tiny jet.

Input

Any information that is entered into a computer.

Interface

A connection that allows you to interact with a computer. An interface also permits the computer to communicate with external devices.

K

Kilobyte

A measure of computer memory (around 1,000 bytes). A page of text, for example, takes up around 2 kilobytes.

L

Laptop

A portable computer with a folding screen.

Laser printer

A printer that uses a laser beam to form high quality printed characters.

LCD

Short for liquid crystal display. It is the commonest type of screen on portable

computers, usually displaying black letters on a greyish-white background (or vice versa).

M

Megabyte

A measure of computer memory - about one million bytes.

Menu

A list of options you can choose from.

Microprocessor

This the most powerful chip in the computer. It is effectively the 'brains' of the computer and ultimately controls all its operations.

Microsoft Windows

A program for communicating with a computer that uses a graphical style of interaction. It is being adopted widely by industry and business worldwide.

Modem

A device that allows you to communicate with other computers over a telephone line.

Monitor

A computer screen.

Mouse

A hand held device with one, two or three buttons. It allows you to point at and select items on the screen. Laptop computers have in-built devices which replace the traditional mouse.

MS-DOS

Microsoft disc operating system - see DOS.

MS-Windows

See Microsoft Windows.

Multimedia

The combination of text, pictures, video, sound and animation for use in presentations.

N

Notebook PC

An A4-sized laptop computer.

Note taker

A braille computer with a word processing capability.

Numeric keypad

A separate part of the keyboard for typing numbers - set up like a calculator.

O

OCR

Short for Optical Character Recognition. It is software that reads text from a printed page and converts it into an electronic form you can work with on your computer.

OS/2

A graphical user interface like MS Windows. A powerful PC is needed to run this operating system.

Output

Any information that comes out of a computer. Output could be a printed page, a page of braille, text read out in synthetic speech or a braille display.

P

Palmtop

A laptop computer with a small keyboard. It is small enough to be held in the palm of the hand.

Parallel port

A socket which supports the transfer of information from one device to another using a technique in micro-electronics known as parallel. Many printers use parallel communication since it is fast.

PC

Short for personal computer. It is now used to describe the whole class of computers that are said to be 'IBM compatible'.

Peripheral

Any external device attached to computer, such as a printer.

Pointer

An on-screen arrow whose position is controlled by the mouse.

Point size

The height of a character. There are approximately 72 points to an inch.

Program

A set of instructions that tells your computer what to do.

Q

Qwerty

The name given to the standard layout of a computer keyboard or typewriter. The word comes from the first six letters of the top row of keys.

R

RAM

Short for random access memory. This is the computer's electronic working memory. Any information stored in RAM is lost when the computer is turned off.

Refreshable braille

see Braille display

ROM

Read Only Memory (ROM) is a memory chip or CD that stores information which the user cannot change.

S

Scalable font

A typeface which can be resized over a wide range of dimensions.

Scanner

A device which copies a page and enters it as an image into the computer's memory. Scanners can be flatbed, like a small photocopier, or hand-held.

Screen

See Monitor or LCD screen.

Serial port

A socket which supports the transfer of information from one device to another using a technique in micro-electronics known as serial. Many braille devices use serial communication.

Soft braille

The cells which make up an electronic braille display line.

Software

A program, or suite of programs, that instruct a computer to perform a task.

Speech synthesiser

A device for turning computer text into synthetic speech.

Spellchecker

A program that checks the accuracy of spellings in a document.

Spreadsheet

A program which allows you to record, structure and manipulate data.

Stand-alone

Independent or complete.

SVGA

Short for Super VGA – see VGA. This update of VGA allows graphics with a resolution of 1024 x 768 pixels in up to 16.7 million colours.

T**TFT**

Short for Thin Film Transistor. A display screen with a much sharper and higher contrast than a LCD-based screen. TFT is only currently available on more expensive laptop computers.

Tractor feed

A device attached or built into a printer or embosser. It has a sprocket which fits the perforations of fanfold paper.

Typeface

A family of characters that has its own design, for example Times Roman.

U**Utility program**

A program that helps you to extend the capabilities of your computer.

V**VGA**

Short for Video Graphics Array. A video adapter for the PC that displays graphics with a resolution of 640 x 480 pixels in up to 16 colours. Computer monitors are described as VGA if they can display these colours.

W**Window**

A rectangular portion of the screen that displays a separate program or document.

Windows

See Microsoft Windows

WordPerfect

A popular business and educational word processor.

Word processor

A program that allows you to produce documentation for a wide range of purposes.

Word wrap

A feature where words are moved automatically from one line to the next as you type.

WordStar

A popular business word processor.

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